

Environmental Assessment and Community Impact Report

For

Moonlight Basin Ranch

AMENDED April 18, 2008



Moonlight Basin

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Introduction

Moonlight Basin Ranch, L.P. (MBR) has received unanimous approval from the Madison County Commissioners on its 2007 Amended Overall Development Plan (ODP) for the remainder of its property. The proposed development in the ODP consists of a golf course, expanded ski terrain and lifts, reserve ranches, and mixed-use cluster development. Accompanying this Environmental Assessment document is a copy of the approved ODP map showing the proposed development envisioned at this time. This ODP will govern future development on Moonlight Basin property.

The development will be a combination of uses that have been established in previous developments at Moonlight Basin (Diamond Hitch, Saddle Ridge Townhouses, and Cowboy Heaven), in addition to new commercial and recreational uses. This includes the seventeen (160+ acre) Reserve Ranches, mixed-use residential and commercial units, recreational areas, day use ski area parking, a golf clubhouse, a golf course, proposed ski lifts and ski runs, and various other recreational amenities which will contribute to a four-season resort. The majority of lots will function as second-homes, vacation houses, and employee residences.

MBR has developed the Moonlight Basin Ski Area adjacent to Big Sky Ski & Summer Resort contributing to a “world class” destination resort. In addition to the ski area, numerous other recreational activities will be provided such as snowshoeing, cross-country skiing, and dog-sledding. MBR is in the process of constructing an 18-hole golf course designed by Jack Nicklaus, providing additional summer-time recreation.

As in the past, development at Moonlight Basin will be with the highest regard to environmental protection. Development areas were selected by utilizing “constraints based” planning, allowing the most sensitive areas to remain undeveloped. In general, the highest density of development will be located near the existing developments adjacent to the ski area and golf course. Water supply and wastewater treatment will be provided by expansion of Treeline Springs, the existing community system.

Chapter 1 . Environmental Description

1-A: Physical Conditions

MBR owns approximately 8,000 acres in the Jack Creek drainage west of the Big Sky Mountain Village. The site occupies Section 34 in Township 5 South, Range 2 East; Sections 1-4, 10-16, 22-24, and 26 in Township 6 South, Range 2 East; and, Section 18 in Township 6 South, Range 3 East, P.M.M., Madison County, Montana. To date, MBR has developed approximately 380 acres on Section 24, near the Moonlight Basin Ski Area. Of this area, over half is dedicated or protected open space.

The ODP proposes cluster developments of approximately 1,651 units of mixed-use residential and commercial development on approximately 715 acres (9% of total), next to the ski area and golf course.

The cluster developments occur where units are provided with scenic views whilst respecting view sheds of others, at the base of ski runs and ski lifts that offer the ease of ski in/ski out living, and near other recreational activities. Figure 1 shows the vicinity map of Moonlight Basin showing the existing Cowboy Heaven development and cluster developments. Approximately 3,040 acres have been platted into Reserve Ranches, two of which have been sold. Development on these tracts is limited to a deed restricted 4-acre home site on each lot.

The accompanying ODP map shows the proposed development, aerial photographic and topographic information. The following sections and their relevant figures provide an environmental description of the site, community impact, and public interest criteria. These include a soil survey map and soil suitability study for the proposed land uses. Also included is information regarding flood hazard, natural water systems, man-made water systems, as well as existing and proposed utilities located within and adjacent to the proposed subdivision. This Amendment to the 2006 Environmental Assessment is intended to update the figures and include additional information specific to the approved 2007 ODP.

1-B: Surface Water

The Moonlight Basin development is located within the Jack Creek watershed, which is a tributary of the Madison River (see Figure 3). The entire Jack Creek watershed is located within Madison County. Jack Creek flows into the Madison River from the east just north of the town of Ennis. The Jack Creek watershed covers 40,989 acres or 71.2 square miles, while the Madison River watershed covers 1,237,453 acres or 2,149.5 square miles in Montana. Thus, the Jack Creek watershed comprises approximately 3.3 percent of the Madison River

watershed in Montana. Within the Jack Creek watershed, the Moonlight Basin development covers approximately 20 percent of the Jack Creek watershed.

A total of 149.1 miles of streams within the Jack Creek watershed are included in the United States Geological Survey's National Hydrography Dataset, including the mainstem of Jack Creek and ten named tributaries. The mainstem of Jack Creek flows in an east to west direction and begins at the confluence of Moonlight Creek and Lone Creek. Other named tributaries within the Jack Creek watershed include Wickiup Creek, South Fork Jack Creek, Levi Creek, Hammond Creek, East Hammond Creek, West Hammond Creek, Aspen Creek and Mill Creek. Once Jack Creek enters the Madison River valley, there are several irrigation diversions branching away from the mainstem of the creek.

Jack Creek USGS Gaging Station

The United States Geological Survey (USGS) operated a streamflow gaging station (06040300) on Jack Creek from 1973 to 1992. Daily streamflow was recorded between 1974 and 1986 and from 1991 to 1992. The USGS gaging station is located near the mouth of the canyon and includes 51.5 square miles of drainage area. Streamflow data includes both peak flow data and mean daily streamflow data (see *Figure 4*). During the period of record, a minimum peak flow of 189 cubic feet per second (cfs) was recorded on June 14, 1977, while a maximum peak flow of 552 cfs was recorded on June 25, 1991. Peak flows generally occurred between early May and late June, with the earliest reported peak flow on May 3, 1985 and the latest reported peak flow on June 25 in both 1975 and 1991. The mean monthly streamflow for the period of record ranged from a high of 162 cfs in June to a low of 13.1 cfs in February. The mean annual streamflow for the period of record ranged from a high of 64.3 cfs in 1984 to a low of 31.2 cfs in 1985.

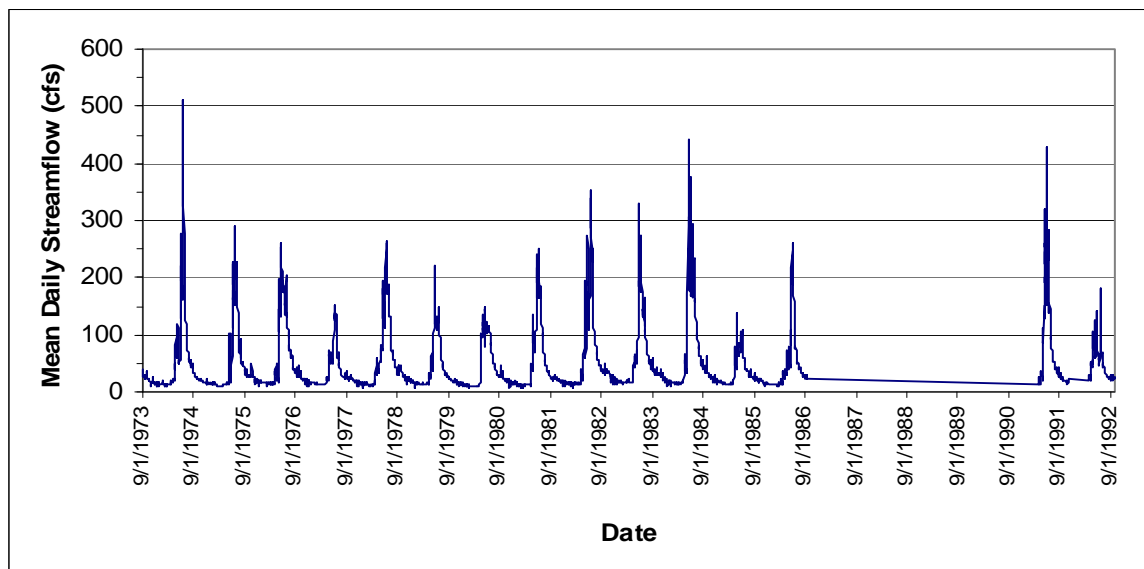


Figure 4 Mean Daily Streamflows at the USGS Jack Creek Gaging Station (06040300), 1974-1986 and 1991-1992.

The Jack Creek Monitoring Project is a water quantity / quality study focusing on the Jack Creek Watershed. The project was started in 2006, and is a joint effort by concerned landowners (of which moonlight is the facilitator) to evaluate and understand the effect headwater development has on the Jack Creek watershed. In addition, we have added an educational component with the help of the science club and Ennis High School. Stream flow, water temperature, and basic chemistry (nutrient, sediment, free oxygen) measurements are taken at 7 points along Jack Creek. One of the stations is located at the historical USGS monitoring station at the mouth of the canyon. We do not have enough data to make correlations with historical data, but newly measured flows are within normal limits in relation to historical data.

303(d) Status of Jack Creek

The Moonlight Basin development is situated in the headwaters of Jack Creek, which is listed as impaired by the Montana Department of Environmental Quality (MDEQ) on the 2004 303(d) List (MDEQ 2004a). A water quality restoration plan, which is also referred to as a Total Maximum Daily Load (TMDL), is required for waterbodies listed as impaired on the 303(d) List. Jack Creek is a tributary of the Madison River that is included within the Middle Madison River TMDL Planning Area, which extends from Quake Lake to Ennis Lake. The Middle Madison River is scheduled for TMDL completion between 2008 and 2012 (MDEQ 2004b).

Jack Creek is listed as a Category 5 waterbody on the 2004 303(d) List, indicating that one or more uses are impaired and a TMDL is required (MDEQ 2004a). The 2004 303(d) List indicated that aquatic life, cold water fishery and recreation beneficial uses were partially supported, while agriculture, industrial and drinking water supply uses were fully supported. Probable causes of impairment include bank erosion, channel incisement, dewatering, flow alteration, other habitat alterations and siltation. Probable causes of impairment include agriculture, crop-related sources and grazing-related sources.

Streams within Moonlight Basin Development

The Moonlight Basin development includes the majority of the Lone Creek watershed and portions of both the Moonlight Creek and Wickiup Creek watersheds. The mainstem of Lone Creek is 2.6 miles long and there are an additional 5.3 miles of tributary streams, which are referred to as West Lone Creek and East Lone Creek. The mainstem of Moonlight Creek is 2.6 miles long and there is an additional 6.3 miles of tributary streams. The mainstem of the Wickiup Creek is 3.3 miles long and there is an additional 3.5 miles of tributaries. At the confluence of Moonlight Creek and Lone Creek, Jack Creek is formed and it flows 2.2 miles within the Moonlight Basin development downstream approximately to the confluence with Wickiup Creek. In addition, two unnamed tributaries flow into Jack Creek from the south between Lone Creek and Wickiup Creek. The Moonlight Basin development also includes a small area within the upper watershed of the Middle Fork West Fork Gallatin River.

Jack Creek

The mainstem of Jack Creek begins at the confluence of Lone Creek and Moonlight Creek and flows through the Moonlight Basin development to the western boundary, which is just upstream of the confluence with Wickiup Creek. A mixed development of low, moderate and high density land use, along with the golf course will occur to the south of Jack Creek, while the primary development planned to the north of Jack Creek will be the Reserve Ranches.

Lone Creek

The Lone Creek watershed includes the mainstem of Lone Creek, West Lone Creek and East Lone Creek. East Lone Creek is formed by two forks, each of which drains one of the two Ulerys Lakes. The mainstem of Lone Creek drains Lone Peak and the watershed is primarily developed with the existing ski runs. High density development is planned along the mainstem of Lone Creek downstream of the existing ski runs, while low density development is planned along Lone Creek just upstream of the confluence with Moonlight Creek. The West Lone Creek watershed is primarily developed with the existing ski runs, with an area of high density development planned just upstream of the confluence with the mainstem of Lone Creek. Development planned within East Lone Creek watershed, which drains Ulerys Lakes, includes high, moderate and low density land use, as well as parking areas and maintenance facilities.

Moonlight Creek

The Moonlight Creek watershed includes the mainstem of Moonlight Creek and several unnamed tributaries. The primary development planned within the Moonlight Creek watershed will be the Reserve Ranches.

Wickiup Creek

The Wickiup Creek watershed includes the mainstem of Wickiup Creek and two unnamed tributaries, which enter the mainstem from the east. The headwaters of Wickiup Creek are in the Lee Metcalf Wilderness Area. The primary development planned within the Wickiup Creek watershed will be the Reserve Ranches.

Unnamed Tributaries of Jack Creek

Two unnamed tributaries flow into Jack Creek from the south between Lone Creek and Wickiup Creek. The more eastern of the two tributaries is longer and flows through the center of the golf course and areas of both low and high density development. The more western of the two unnamed tributaries flows through the western edge of the golf course and an area of low density development. This tributary flows into Jack Creek just west of the Moonlight Basin development boundary and a short way upstream of the Wickiup Creek confluence.

Middle Fork West Fork Gallatin River

The Middle Fork West Fork Gallatin River watershed drains the south eastern corner of the Moonlight Basin development. This area includes existing ski runs and residential development.

Waterbodies within the Moonlight Basin property

There are 3 named waterbodies within the Jack Creek watershed: Lost Lake, Shadow Lake and Ulerys Lakes. Only the more western of the two lakes termed “Ulerys Lakes” is within the Moonlight Basin development. This lake covers 8.15 acres, found on a tributary of Lone Creek.

1-C: Ground Water

Groundwater resources are dictated by the underlying geologic formations. Surface geology of the Moonlight Basin property was recently mapped as part of the Ennis 30'X60' Quadrangle (1:100,000) by Kellogg and Williams in 2000 (USGS Map I-2690). The portion of this map covering Moonlight Basin is provided in Figure 5. Surface geology can be split into two categories: Quaternary till surface deposits; and Cretaceous shale, sandstone, and dacite (igneous) bedrock formations.

Quaternary till deposits range in thickness from 10 feet to over 200 feet and overlay bedrock formations, often times obscuring the underlying geologic formation. Till deposits consist of mixed clay, sand, and rock.

Cretaceous bedrock formations consist primarily of shale layers, with occasional sandstone formations. The Lone Mountain intrusion placed dacite (commonly referred to as andesite) lenses between beds of sandstone and shale. Subsequent structural folding has uplifted and distorted the bedrock formations.

These two geological groups create two distinct groundwater regimes. A discontinuous shallow groundwater regime is scattered throughout the till deposits and a deeper groundwater regime exists in the bedrock formations below.

The shallow groundwater system in the till deposits is supplied principally by precipitation and runoff. Heterogeneous clay layers in the till deposits intercept percolating snowmelt and precipitation and cause water to emerge in wetlands in nearby depressions. Nearly all groundwater in the shallow till system discharges to wetlands and thence to streams. In numerous locations wetlands do not have a direct discharge to a stream. In these “isolated” wetlands, water percolates out of the wetland back into the shallow groundwater system, where it emerges once again in a down gradient wetland. This cycle can be repeated many times until eventually water is discharged into a stream and leaves the shallow groundwater system. Travel times tend to be very short in the shallow groundwater regime

and water quantity and flow rate can change dramatically throughout the year from wet years to dry years.

Below the shallow groundwater system is a deeper regime where groundwater flows through bedrock formations. Groundwater is typically confined, flowing wells are common.. Depth to water bearing formations ranges from 150 feet to 400 feet. Formation structure and porosity creates a large amount of heterogeneity in this regime. The Cretaceous formations are made predominantly of shale deposits which have low porosity and permeability. In these formations groundwater will preferentially flow through fractures, or in layers of higher permeability. Dacite lenses intruded into the Cretaceous formations, typically create localized fracture systems and can provide an aquifer with higher porosity and permeability. The aerial extent and thickness of dacite lenses is not uniform and varies dramatically across the property.

Groundwater recharge to the bedrock formations primarily occur on the mountain slopes where formations are exposed or near the surface and not covered by deep till deposits. The shallow soil, limited vegetation, and high precipitation on the mountain slopes allow for a potentially high rate of recharge. Bedrock formations discharge to the shallow groundwater regime or directly to streams. Travel times appear to be on the order of several years and the water quantity and flow rate are less variable than the shallow groundwater system.

1-D: Wetlands

Wetland and Non-Wetland Waterway Resources

Wetland delineation has been conducted on a large portion of the Moonlight Basin property. by PBS&J (formerly Land and Water Consulting). Technical criteria outlined in the Army Corps of Engineers (COE) Wetlands Delineation Manual (Environmental Laboratory 1987) were used to classify hydric soils, wetland hydrology and hydrophytic vegetation. A wetland must exhibit positive criteria in all three of these categories.

Natural drainage features not satisfying wetland criteria were generally delineated as non-wetland waterways if they exhibited a clear bed and bank, ordinary high watermark and are generally unvegetated or are comprised of sparse hydrophytic vegetation. These non-wetland waterways are classified as waters of the U.S. when they connect to a water feature that is classified as jurisdictional by the COE. Such non-wetland areas in disturbed (cleared / filled) areas such as road, ski run, and lift line corridors were considered erosion gullies and were generally not delineated as waterways. Areas where ephemeral or temporary sheet flow dispersed / diffused through vegetated uplands were also not considered waterways.

Wetland and non-wetland waterway boundaries in the project area were flagged and numbered sequentially on the ground. Flag locations were located and

mapped by Stahly Engineering and Associates and Moonlight Basin Survey personnel using survey-grade GPS and/or conventional survey equipment and methods. Delineated wetlands are shaded on Figure 6.

Wetland and non-wetland waterways investigations began in 2003 and have progressed each year (see *Table 1*). MBR owners have established policies to insure that the water resources are inventoried, proposed impacts are permitted, and mitigation is designed prior to the onset of development in an area. The majority of wetland types found within the investigated areas are slope and depression wetlands. Riverine and non-wetland waterways were identified within all areas, as well as combinations of all wetland types. Jurisdictional status of all features are included in Appendix A: Table 1-A (Phases 1 and 2); Table 2-A (Golf Course); Tables 3a-A and 3b-A (Jack Creek Road East and West, respectfully.); Table 4-A (Reserves); no table is available for Other Phases (wetlands are delineated as needed and data are not combined into one source). The final jurisdictional status for wetlands with unknown status' is determined by the COE during the permitting process in the event the wetland is scheduled for impact.

The COE takes jurisdiction over wetlands and non-wetland waterways if the feature is connected or adjacent to a jurisdictional wetland, stream or river. Impacts to jurisdictional wetlands must be mitigated. No mitigation is necessary for non-jurisdictional or isolated wetlands, or stream beds that do not connect to other jurisdictional features.

Table 1. Summary of the Moonlight Basin wetland and non-wetland waterway Investigations.

Area of Investigation	Period of Investigation	Wetlands Acreage	Non-Wetland Waterway Acreage
Areas 1 and 2 (ski area)	7/03-10/03	20.8	5.8
Golf Course	6/05-7/05	48.4	4.7
Jack Creek Road ¹	9/05 and 8-9/05	n/a ⁴	n/a ⁴
Reserves and Access Roads ²	8/05-9/05	n/a ⁴	n/a ⁴
Other Phases	7/03-10/05 ³	n/a ⁴	n/a ⁴

¹ East and west segments combined.

² Data not available, approximately 20 wetlands or waterways have been delineated to date.

³ Information Not Available

404 Permit

Moonlight has been permitted under Section 404 of the Clean Water Act to place fill into specific wetlands. The permit was approved by the USACE and classified as Corps File No. 200590100. Under this permit we are required to mitigate for all jurisdictional wetland impact. Impacts outlined under the original permit are

mitigated by creation of 1.5 units of wetland for every 1 unit of wetland impacted. After 2007, all impacts are regulated at a 2:1 ratio. Moonlight has completed ~10 acres of mitigation within the Madison Valley; for specific information refer to Appendix L.

Riparian Areas

Areas adjacent to or on the banks of a stream course are classified as riparian. All intermittent and perennial waterways with a bed and bank (scour) were flagged and surveyed as part of the wetland and non-wetland waterway investigation. If the vegetation along the waterway was greater than 50% wetland species (and the hydrology and soils qualified as a wetland) the area was included in the waterway delineation. Riparian vegetation associated with bed and banks or non-wetland waterways typically include an overstory of woody species such as alder (*Alnus spp.*), willow (*Salix spp.*), Engelmann spruce (*Picea engelmannii*) or subalpine fir (*Abies lasiocarpa*); all of these species with the exception of subalpine fir qualify as hydrophytic species.

Flood Prone Areas

Flood plain maps do not exist for perennial or intermittent streams, nor have flood hazard evaluations been conducted. Most of the mountain channels within the basin are fast moving (moderate to high gradient) and found in narrow v-canyons related to steep terrain. Where lots are proposed adjacent to waterways, a minimum 100-foot construction setback will be maintained. This setback is required by the Madison County Subdivision Regulations (2006), as amended.

Other than road crossings, no construction activities within the stream bed or bank are proposed. No irrigation ditches or canals exist within the property.

1-E: Geology, Soils, and Slopes

Geology

A geologic map of the Moonlight Basin property is provided in Figure 5. This area was mapped as part of the Ennis 30'X60' Quadrangle (1:100,000) by Kellogg and Williams in 2000 (USGS Map I-2690). Surface geology can be split into two categories: Quaternary till surface deposits; and Cretaceous shale, sandstone, and dacite (igneous) bedrock formations.

A Map Key on Figure 5 shows the formations present at Moonlight Basin. Simplified descriptions of the formations based on geologic mapping are provided here.

Qr Rock Glacier deposits (Holocene and upper Pleistocene) Hummocky, lobate deposits of angular boulders. Thickness is about 60 feet.

Qti Till (upper Pleistocene) Mixed sand, silt and clay with boulders. Thickness varies from 10 feet to over 200 feet on the property.

- Ql Landslide deposits (Holocene and upper Pleistocene) Chaotic oriented debris to almost intact slump blocks of bedrock. Thickness ranges from 30 to 150 feet.
- Kd Dacite porphyry of Fan and Lone Mountain's (Late Cretaceous) "Andesite" sills intruded into cretaceous sedimentary rocks. Beds dip away from the central peaks of Fan and Lone Mountains. Thickness ranges from 0 to 250 feet.
- Kf Frontier Formation (Upper Cretaceous) Alternating black shale and light-gray to yellowish-tan sandstone. Ratio of sandstone to shale is about 1:3. Thickness is 450 feet to 600 feet.
- Kmo Mowry Shale (Upper Cretaceous) Brownish-gray and greenish-gray mudstone and shale. Thickness is 300 feet to 600 feet.
- Kmt Muddy Sandstone and Thermopolis Shale, undivided (lower Cretaceous) Muddy sandstone is a brown to brownish-gray salt and pepper sandstone. Thickness varies from 60 feet to 150 feet. Thermopolis shale is black to dark gray shale and silty brown sandstone. Thickness is 200 to 250 feet thick.

Most of the development is located in Quaternary Till deposits overlying the upper cretaceous Frontier Formation. Steeper areas are typically supported by sandstone ledges or dacite formations.

Preliminary development clusters were evaluated for geotechnical hazards to determine risk associated with instability. The preliminary geotechnical hazard map is shown in Figure 7. Preliminary development areas were color coded from most to least risk with red being the highest risk and green being the lowest. After this geotechnical evaluation the development clusters were modified to avoid all areas of high risk of instability. A copy of September 20, 2004 report and February 2, 2007 report is included as Appendix B.

For low risk sites the hazard evaluation recommends geotechnical investigations for foundation design and building location. For development areas with slight risk, geotechnical investigations for site mitigation of localized site stability would be required to determine appropriate construction measures. High risk areas that would require unconventional foundation systems have been avoided.

Soils

Soils are mapped in the Madison County Soil Survey. Map unit boundaries are shown overlain on the ODP map in Figure 8. Most of the ODP and all of the proposed development clusters are within the map units #73, #121, #125, and #159. These soil types are described further here.

#73 MacFarlane stony sandy loam, 15-45% slopes.

This soil is deep and well drained and located mainly on glacial moraines and mountain sides. This soil's principal limitation is steep slopes requiring aggressive revegetation and erosion control.

#121 Shadow very channery loam, 15-45% slopes.

This soil is deep and somewhat excessively drained and located on glacial moraines and mountain sides. This soil's principal limitation is steep slopes requiring aggressive revegetation and erosion control.

#125 Shadow, warm-Mikesell Worock Complex, 45-70% slopes.

This soil is made up of three soil types. The soils are deep and well to somewhat excessively drained. These soils are located on mountain sides with the Shadow soil near the top and the Mikesell soil near the bottom. These soils' principal limitation is steep slopes requiring aggressive revegetation and erosion control. The Mikesell soil has low soil strength when wet.

#159 Worock-Mikesell complex, 15-45% slopes.

These soils are deep and well drained and located on mountain sides with the Worock soil being on the upper portion and the Mikesell being near the bottom. These soils' principal limitation is steep slopes and the Mikesell soil has low soil strength when wet.

With all of these soils present the greatest limitation is steep slopes. The development areas have been located to avoid the steepest slopes, reducing the effects of this limitation. The Mikesell soil tends to occupy clayier regions near the wetlands and for the most part will be avoided.

Soil information for the project area was gathered from the Soil Survey of Madison County Area, Montana (Soil Conservation Service [SCS], 1989). The SCS, currently known as Natural Resource Conservation Service (NRCS), soil descriptions provide soil data sufficient for comprehensive planning but not necessarily for site-specific project implementation. Ratings that indicate a potential hazard due to erosion or stability may require additional onsite analyses to determine suitability for building sites, roads, etc.

Soils in the project area are located on moderate to steep slopes which are typically forested. The soils are formed from glacial deposits, alluvium, colluvium / slope wash and bedrock derived from Cretaceous sedimentary rocks, local Tertiary volcanic and intrusive rocks, and Precambrian granite and gneiss. The majority of the soils have a high percentage of coarse fragments ranging in size and character from small shale fragments to various sizes of flagstones (flat rectangular rock fragments). Topsoil texture range from loam to very flaggy sandy loams and subsoil (layers of soil beneath the topsoil) textures range from clay loam to very flaggy sandy loam.

Figure 8 delineates the boundaries of the soil units present within the project area. Table 2 summarizes the salient physical and hydrologic characteristics of the soils by map unit and addresses their potential for erosion. Characteristics for soil units within the proposed development are described in this section.

Soil Units within the Moonlight Basin Development

There are eleven different soil types within the Moonlight Basin development based on soil survey geographic data base.

Cryaquolls, nearly level (38)

The cryaquoll soil comprises a very small area of the Moonlight Basin development and is located along Jack Creek. This map unit consists of deep, poorly drained and very poorly drained soils along streams and drainageways. Soil texture range from a clay loam to loamy sand. No development is planned on this soil type.

Garlet, cool-Rock complex (47)

The Garlet, cool-rock complex is found along the north face of Lone Peak at or below timberline. This soil unit is typically found on mountainsides ranging from 45 to 70% slopes. The upper portions of both the existing runs and planned ski runs occur on this soil type. This unit is comprised of approximately 70 percent Garlet very channery sandy loam and 20 percent Rock outcrop. The Garlet component is found on side slopes and the Rock outcrop component is on ridges and knolls. Garlet soil is deep and well drained and the Garlet very channery sandy loam has a high erosion hazard when disturbed (USDA 1989).

MacFarlane stony sandy loam (73)

The MacFarlane stony sandy loam is found within the Ulery's Lakes area, as well as in both the Moonlight Creek and Wickiup Creek watersheds. Both low and high density development, along with parking areas and the Reserve Ranches are planned within this soil unit. This soil is deep and well drained. This coarse textured soil occurs primarily on glacial moraines and mountainsides and has a moderate hazard of water erosion that increases when disturbed (USDA 1989).

Mikesell clay loam (80)

The Mikesell clay loam soil type is found in a limited area along the western boundary of the Moonlight Basin development. This is a deep, well-drained soil on mountainsides and foot slopes. No development is planned on this soil type.

Rock outcrop-Cryoborolls-Cryochrepts (109)

The rock outcrop-cryoborolls-cryochrept soil unit is found in the upper bowls of Lone Peak. The rock outcrop is mainly exposures of andesite, gneiss, limestone and conglomerate. Size of the rock fragments ranges from large boulders to fine angular gravel. These areas support little vegetation. Limited development of existing ski runs has occurred on this soil. No other development is planned on this soil unit.

Shadow very channery loam (121)

The shadow very channery loam is a deep, somewhat excessively drained soil found on glacial moraines and mountainsides. The lower portions of the existing ski runs occur within this soil type, as well as some residential development. The shadow very channery loam has a moderate erosion hazard that increases when disturbed (USDA 1989).

Shadow very flaggy loam (122)

The shadow very flaggy loam soil type is a deep, somewhat excessively drained soil found at the headwaters of Moonlight Creek. Very little development is planned within this soil type. The hazard of water erosion on this soil type is high (USDA 1989).

Shadow, warm-Mikesell-Worock complex (125)

The shadow, warm-Mikesell-Worock soil unit is found along the mainstem of Jack Creek. Low density development, Reserve Ranch homesites and the western end of the golf course are planned within this map unit. The shadow soil (channery loam) is found on the upper parts of mountainsides and is somewhat excessively drained. The Worock soil (gravelly loam) is found on midslopes of mountainsides, while the Mikesell soil (clay loam) is found on less sloping, and lower lying mountainsides. Mikesell and Worock soils are deep, well-drained and water erosion is a hazard on these soils. In addition, the Mikesell soil has low strength when wet, leading to poor trafficability and the possibility of compaction when wet (USDA 1989).

Shedhorn-rock outcrop complex (128)

The shedhorn-rock outcrop complex map unit is found on glacial moraines and mountainsides. Only the Reserve Ranches are planned on this soil unit. The shedhorn soil type is deep and well-drained and the hazard for water erosion is high (USDA 1989).

Whitore-Mikesell, warm-Rock outcrop complex (154)

The Whitore-Mikesell, warm-Rock outcrop complex soil unit is found on mountainsides in the headwaters of both Wickiup Creek and Moonlight Creek. Only the Reserve Ranches are planned for this soil unit. Both the Whitore and Mikesell soils are deep and well drained, with a high water erosion hazard (USDA 1989).

Worock-Mikesell complex (159)

The Worock-Mikesell complex soil unit is found on glacial moraines and covers much of the proposed development area, including the majority of the golf course and the associated low, moderate and high density developments. The lower portions of both the existing and planned ski runs, along with associated parking areas and maintenance centers are found on this soil type. Portions of this soil are also found in both the middle portions of the Wickiup Creek and Moonlight Creek watersheds, where Reserve Ranch development is planned. The Worock,

a very stony loam, is mainly on the tops and sides of hills and has a moderate erosion hazard that increases when disturbed. The Mikesell clay loam is found on hillsides and foot slopes and has a high erosion hazard and low strength when wet. Both of these soil types are deep and well drained (USDA 1989).

Table 2. Physical and hydrologic characteristics of soils within the project area

Map Symbol	Soil Name	Percentage of Project Area ¹	Coarse Fragment	Soil Depth ²	Permeability	Erosion Potential ³
38	Cryaquolls	<1%	0 to 10%	deep	poor	low
47	Garlet	12%	40 to 70%	deep	moderate	high
73	MacFarlane	26%	35 to 60%	deep	moderately rapid	moderate
80	Mikesell clay loam	<1%	0 to 20%	deep	slow	high
109	Rock outcrop-Cryoborolls Cryochrepts	4%	5 to 70%	shallow to deep	moderate	high
121	Shadow very channery loam	14%	45 to 70%	deep	moderately rapid	moderate
122	Shadow very flaggy loam	<1%	45 to 70%	deep	moderately rapid	high
125	Shadow, warm-Mikesell-Worock complex	11%	45 to 70%	deep	slow to moderately rapid	high
128	Shedhorn-rock, outcrop complex	3%	5 to 35%	deep	moderate	high
154	Whitore-Mikesell, warm-Rock outcrop complex	2%	20 to 35%	deep	moderate	high
159	Worock-Mikesell complex	29%	5 to 35%	deep	moderate to slow	moderate to high
231	Water	<1%	----	----	----	----

¹ Based on a project size of 8107 acres.

² Shallow = 20"

Moderate = 20 – 40"

Deep = >40"

³ Refers to the water erosion hazard.

Slopes

Slopes range from gentle to very steep across Moonlight Basin. Topographic contours are shown on Figure 2. Development areas are located in places with lesser slopes and very steep slopes are avoided. Portions of the development clusters contain slopes over 25%. These areas were only considered if the geotechnical hazard evaluation determined that these areas could be developed with conventional methods.

Design covenants for the overall development plan restrict building on slopes greater than 25%. The implementation of engineering measures to address the potential for slope failure will also reduce the potential impacts. Critical areas are those units comprised of steep slopes underlain by clay-rich subsoil. Soil units with inclusions of clay rich subsoils include 125 and 159, the Mikesell clay loam.

This soil is typically found on less sloping and lower mountainsides. However, site-specific geotechnical investigations will be performed prior to construction in these areas. Avoiding construction and road building in areas of steep slopes will minimize the potential for slope failure. If such areas are disturbed, appropriate engineering and geotechnical studies will be performed.

Indirect effects to the soil are primarily related to vegetation success. Long-term erosion and associated sediment loss results when ground cover is removed and surface water is allowed to concentrate. This can be mitigated by sediment control and re-vegetation efforts. The use of proper seedbed preparation techniques and appropriate seed mixes and fertilizer rates will aid in the establishment of vegetation. Areas of complete removal of vegetation will be limited to parking lots, roads, and building construction. Existing ground cover will be maintained whenever possible on the remaining development.

1-F: Vegetation

The vegetation resource was assessed for the identification and distribution of the major plant communities (cover types) and conditions relevant to vegetation such as threatened, endangered and sensitive plant species and noxious weeds.

In general, the Moonlight Basin area occurs within the *Subalpine Forest* vegetation type (Nesser, 1973) with an elevation range of 7,000 to 9,800 feet. With the rise in elevation the soils become rockier, the climate becomes cooler, stand-replacing fires become infrequent, and lodgepole pine-subalpine fir forest is replaced by open woodlands of whitebark pine and a mosaic of krummholz and alpine grass. Primary tree species found within the project are indicative of those found in the *Subalpine Forest* vegetation type which includes subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*) and white-bark pine (*Pinus albicaulis*), all of which commonly occur in the project area. Douglas-fir (*Pseudotsuga menziesii*) and lodgepole pine (*Pinus contorta*) colonize the drier forested sites with a south and west aspect.

The growing season was estimated at approximately 77 days. For the period between March 1, 1984 and December 31, 2004, the average annual precipitation was 20.54 inches, with annual snowfall of 138.8 inches. Climate information for the project area was extrapolated from the Big Sky 3S station, located at 6,660 ft elevation (Western Regional Climate Center, 2005).

Prior to the property acquisition by MBR. owners, the property was owned by Plum Creek Timber Company, Inc. Old growth forest consisting primarily of lodgepole pine and fir were logged during the 1970's through the 1980's. Currently regeneration of primarily lodgepole pine represents different age classes in historic logged areas. Changes in the forest have occurred due to fire (prescribed and wild fires), logging, disease and insects (blister rust, mountain pine beetle) in the area.

The distribution and relative extent of specific vegetation cover types within the overall development plan areas were extracted from the Montana Gap Analysis Project (see *Figure 11*). Additional information was obtained from a 2004 aerial photograph, Madison Range Ecosystem Assessment (USDA Forest Service, BLM, FWS), Beaverhead-Deerlodge National Forest (USDA Forest Service) and botanist/wetland scientists (2003, 2004, and 2005).

A total of 14 different vegetation cover types were identified within the project area. The three main cover types representing the majority of the cover are: montane parkland and subalpine meadows, mixed subalpine forest, and Douglas-fir forest. Other minor vegetation types include grasslands, shrublands, sagebrush, lodgepole pine, mixed whitebark pine forest, conifer riparian, mixed riparian, and mixed barren sites.

Table 3 provides a summary of the vegetation types and their respective estimated acreages. Figure 11 delineates the locations of each cover type and its relative abundance. Brief descriptions of only the three key vegetation units are presented.

Montane Parklands and Subalpine Meadows (3180)

The parkland and meadow cover type represents approximately 43% of cover type within the project area and is primarily associated with historic logging and fire. This cover type is common at mid to upper elevations and occurs on all aspects. The majority of the proposed building sites and development will impact this cover type (golf course, residential lots, parking lots and roads). Common grass and forb species include pinegrass (*Calamagrostis rubescens*), arnica (*Arnica spp.*), brome (*Brome spp.*) and elk sedge (*Carex geyeri*). Young lodgepole pines occupy portions of this cover type ranging from 10 to 75% cover, depending upon the age of disturbance. The photographs provided below are two examples of this cover type taken in June 2004 (see *Figure 9 and 10*). Note the varying range of conifer cover and remnants of historic logging/fire.



Figure 9



Figure 10

Mixed Subalpine Forest (4270)

The mixed subalpine forest is the second largest cover type within the Moonlight Basin project area representing approximately 34% of the cover. Subalpine fir comprises greater than 10% of the tree cover, with a total tree cover ranging from 20 to 80%. Dominant tree species include subalpine fir, Douglas-fir, Engelmann spruce and lodgepole pine. Associated understory species include huckleberry (*Vaccinium spp.*), grouse whortleberry (*Vaccinium scoparium*), arnica, beargrass (*Xerophyllum tenax*) and elk sedge. This type is found primarily on north, east and northwest aspects. This cover type occupies the southern portion of Moonlight Basin and is traversed by a network of drainages (Lone Creek and Jack Creek, access road, ski run; and lift line corridors). Historic logging areas within this vegetation type are limited to the southwestern corner of the property.

Douglas-fir Forest (4212)

This vegetation cover type is found at mid elevations (7,000 to 8,200 feet) generally on south or west facing slopes and represents approximately 7% of the cover type within Moonlight Basin. Conifer forest is dominated by Douglas-fir ranging from 20 to 90%. Common shrubs include ninebark (*Physocarpus malvaceus*), spirea (*Spiraea betulifolia*), western snowberry (*Symphoricarpos spp.*) and drought tolerant grasses such as bluebunch wheatgrass (*Agropyron spicatum*), Idaho fescue (*Festuca idahoensis*) and pinegrass. This cover type occupies the eastern and northern most vegetation type. Lodgepole pine and Douglas-fir were key species removed for timber harvest while the property was owned by Plum Creek.

Open, grassy areas were typically observed on historically logged areas. Dry forest sites on south and west exposures have more open stands of Douglas-fir and lodgepole pine with smaller amounts of limber pine and juniper. More moist aspects and higher elevations are dominated by subalpine fir, lodgepole pine, whitebark pine and spruce. Alpine forb and grass communities intermixed with wind-stunted coniferous forests of whitebark pine, subalpine fir and spruce are found at higher elevations.

Threatened and Endangered/Sensitive Plant Species (TES)

Information on TES plants was obtained from the U.S. Forest Service and the Montana Natural Heritage Program (MNHP) for the Beaverhead-Deerlodge National Forest and Madison County (Appendix C). Currently, there are no known occurrences of plants listed for Moonlight Basin that have been identified as threatened or endangered under the provisions of the Endangered Species Act of 1973. If any species are identified, appropriate measures, pursuant to Section 7 of the Endangered Species Act, will be taken to protect their habitat.

The MNHP produced a list of special concern plant species known or suspected to occur in the project vicinity. The regional biologist for the forest service also provided a list of sensitive plant species that could potentially exist in the area. Appendix C provides the complete rank and status of plant species of special

concern for Madison County and Beaverhead National Forest. The MNHP list identifies three plant species of special concern; a state champion tree (*Pinus albicaulis*) is within the project boundary. One (1) vascular plant (*Adoxa moschatellina*) and one (1) nonvascular plant (*Tayloria serrate*) are known to occur adjacent to or outside the Moonlight Basin property boundary. The map included in Appendix E shows this location.

Noxious Weeds

Noxious weeds are a state-wide concern due to their negative impacts on native plant communities. As mandated by the 1985 Weed Control Act, the Madison County Weed Board has compiled a noxious weed list containing all State Category I, II, and III noxious weed species, as well as County listed noxious weeds (Category IV). The County Weed Board has identified four potentially problematic noxious weeds within the project area: Canada thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), spotted knapweed (*Centaurea maculosa*) and field scabious (*Knautia arvensis*).

Table 3. Moonlight Basin Vegetation Types as displayed on Figure 11

	Title	Description	Acres ¹
3150	Low/Moderate Cover Grasslands	Mid to high elevation on south aspects. Short to medium height grass - cover 20 to 70%.	43
3170	Moderate/High Cover Grasslands	Mid elevations on south/west aspects. Medium to tall grass, cover 50 to 100%.	8
3180	Montane parklands and subalpine meadows	Mid to upper elevation meadows within forests or at timberline. Total herbaceous cover ranges from 30 to 100%. Primarily historically logged/burned areas.	3546 acres
3200	Mixed mesic shrubs	Occur as small cover types along draws or north slopes at mid to higher elevations.	18 acres
3350	Sagebrush	Occurs as scattered patches at low to mid elevations. Shrublands are dominated by sagebrush species which represent 20 to 80% cover.	375 acres
4203	Lodgepole pine	Limited to scattered small patches on cooler aspects at mid-high elevations. Conifer forest dominated by lodgepole pine with 20 to 100% cover.	108 acres
4212	Douglas-fir	Occurs in lower to mid elevations. Conifer forest dominated by Douglas-fir.	560 acres
4223	Douglas-fir/Lodgepole pine	Occur as small, isolated areas at mid elevations in the northwestern quarter of the project area.	62 acres
4260	Mixed whitebark pine forest	Occurs mid to high elevations, typically adjacent to Douglas fir.	129 acres
4270	Mixed Subalpine forest	Occurs in mid to high (6,400 to 9,400 ft) elevations primarily on north, east, and northwest aspects. Mixed conifer forest with greater than 10% subalpine fir with a total tree cover from 20 to 80%.	2776 acres
4290	Mixed Xeric Forest	Douglas-fir, Ponderosa pine and Rocky	112 acres

		mtn juniper –occurs as small isolated patches, primarily along the portion of Jack Creek at lower elevations.	
6110	Conifer riparian	Limited to the western property boundary along Jack Creek. Engelmann spruce, and subalpine fir key overstory species.	36 acres
6400	Mixed riparian	Riparian areas dominated by a mix of shrub and herbaceous species. Tree cover is less than 15%.	21 acres
7800	Barren areas	Barren sites where live vegetation has less than 10% canopy cover – gravel pits, stock pile areas, storage facilities.	36 acres
7300, 8100 9100	Rock, talus, snowfields	Non-vegetated areas	277 acre

¹ ~estimated acreages based on a total of 8000 acres.

During the wetland delineations conducted within Moonlight Basin from 2003 through 2006, small, infrequent isolated infestations of noxious weeds were noted. These weeds included Canada thistle (Category I), spotted knapweed (Category I), and musk thistle (Category IV).

Canada thistle plants were occasionally noted in historic burn areas associated with logging, along old logging roads or access roads. Spotted knapweed was noted in very small isolated areas along the western portion of Jack Creek Road and South Side Road downslope of the proposed golf course. Musk thistle was very minor and only noted near the western entrance of Jack Creek Road.

Historical impacts to the area from logging have altered the vegetation community types, structure and patterns. Under the proposed land use plan, primarily parkland/meadows (historically logged/burned areas), mixed subalpine fir and Douglas-fir cover types will be impacted (see *Table 4*). Of the total 8,000 project acres, only 12% will be impacted by the proposed development.

Timber productivity for the forested cover types is low to moderate, due to historic logging and age class of re-growth (Pfister and others, 1977). Relative to the historic impacts that resulted from logging, effects of the additional development to the vegetation resource will be minimized by preserving native vegetation to the maximum extent possible. Native vegetation will be preserved by open space reserves, stream setbacks, and restricted building envelopes. Within the Reserve Ranches, home construction will be limited within the 4-acre building envelope. When possible, the building envelopes have been designated within historically cleared areas to further minimize disturbance. Driveways are located in historic roadways or in areas to minimize vegetation disturbance and/or avoid wetland impacts. Soil erosion and the invasion of noxious weeds will be minimized through the implementation of the weed control plan and a storm water management plan. There are no threatened or endangered vegetation species listed within the project area. Sensitive species habitat is primarily

riparian/wetland, open slopes, ridges or high elevation and unlikely to be affected.

Table 4. Proposed Land Use within each cover type and percent disturbance

Title		Proposed Land Use	Acres	Percent ¹
3180	Montane parklands and subalpine meadows	Development Clusters	427	
		Parking lots	15	
		Proposed road and road improvements	23	
		Ski runs/lifts	60	
		Golf course	80	
		Subtotal	605	7.5
4270	Mixed Subalpine fir	Development Clusters	114	
		Parking lots	13	
		Proposed roads and road improvements	46	
		Ski runs	60	
				Subtotal
4212	Douglas-fir	Development Clusters	40.5	
				Subtotal
3350, 4203, 6130, 7300, 7800	Sagebrush, lodgepole pine, mixed riparian, and mixed barren sites	Development Clusters	48	
		Proposed roads and road improvement	8	
		Ski runs/ lifts	20	
		Golf course	10	
				Subtotal
TOTAL			964.5	12%

¹ Percent disturbance to each cover type is based on the total project area of 8,000 acres.

1-G: Wildlife and Wildlife Habitat

Major Species

The big game species that has key winter range in the area owned by MBR include moose and mule deer. Some mule deer winter range occurs on the south side of the main Jack Creek drainage between Wickiup and Hammond knob (see *Figure 12*). This is marginal winter range and holds deer during the moderate winter periods. When and if heavy snow occurs and persists in this area the deer will move toward the west where snow depths are typically less. Moose are widely dispersed in the bottom of Jack Creek and many of its tributaries during the winter (see *Figure 13*). During the winter, moose are few in number in Jack

creek and have the ability to move readily through the drainage within the timbered areas where snow conditions are less deep and usually not hardened by wind action.

Bobcats and occasional lynx occur in most mountainous areas which contain snowshoe hares. Snowshoe hares are found widespread in the Jack creek area and are associated with the immature forests and forest edge, both of which are in abundance. Some wolverine use may occur in the area at times in search of carrion or prey. They generally are associated with the occurrence of large game animals such as deer and elk.

Mallard, green-winged teal and ring-necked duck are waterfowl species which inhabit the area during the summer and are associated with the ponds and lakes in the area. Because of development setback requirements, the lack of livestock grazing and the absence of free-ranging pets, the breeding requirements, nesting and brooding habitat will be maintained.

Whitebark pine habitat types usually located at higher elevations are important as a source of pine nuts for grizzly bears during spring and fall. This habitat type is at a higher elevation than most of the development proposed by MBR.

MBR is currently working with the Wildlife Conservation Society's Wolverine Team to develop a monitoring plan for wolverines and with the Interagency Grizzly Bear Study Team (IAGBST) to develop a plan to track sensitive species as they use Moonlight and surrounding area. MBR continues to meet with the other entities in the area, resorts, and the Sierra Club to develop and programs to protect species and inform the public. MBR has developed brochures to distribute to owners and guests telling of the best ways to deal with wildlife and how to properly handle encounters (See "**Wildlife Safety Guide**" as Appendix G). MBR actively communicates with the public by giving talks to a variety of groups, Madison Valley Public Library, Ennis Science Club, Jack Creek Preserve, weekly fireside talks at the Moonlight Lodge, Madison River Foundation, Bozeman Watershed Festival, and Moonlight hosted Discovery Days for Ennis K-3 students.

Protection of Wildlife Habitat

There are three basic factors which affect the occurrence of wildlife within any area: tradition, availability of food and habitat security. These factors "hold" wildlife in a particular area. Significant reductions in the latter two factors either will break the "hold" or reduce the survivability of the remaining animals. Reasonable efforts will be made to avoid taking actions that would jeopardize wildlife habitat security. The following actions will be implemented by MBR to minimize the effects of development on wildlife in the Jack Creek drainage:

1. Single residential ownerships will be in the middle basin (above Hammond Knob). Buildings and other improvements must be located within predetermined deed restricted 4-acre homesites, with the remaining

acreage set aside as undeveloped "common areas".

2. Buildings and other structures will be located at least 100 feet from any perennial streams. Roads will also be designed to meet this requirement except at stream crossings, where alignment will cross the key habitat feature perpendicular to the direction of flow.
3. Building sites and roads will be located to avoid ridge line silhouetting and exposure to large openings. This will reduce disturbance (both visual and auditory) to Wildlife from human activities normally associated with developments. Clusters of large trees may be requisite on some building sights.
4. Site restoration projects may be required on common area acreage to enhance wildlife habitat and natural aesthetics. Additional restoration work will be required by the landowner on disturbance areas, as approved by the MBR Design and Review Board. In addition to facilitating natural vegetation recovery, the purpose of restoration projects is to limit the effect of human activity and enhance wildlife connectivity through the property. Control of noxious weeds will be required of property owners.
5. Grazing by livestock and roaming pets will not be permitted.
6. No feeding or domestication of any wildlife shall be permitted. All rules, regulations, and laws established by the State of Montana, Fish, Wildlife, and Parks Department, or county or municipal governments must be followed. No salt licks, bird feeders, or other foods shall be placed upon any property to entice wild animals to come upon the property. Items such as bird feed, horse feed, grains, and dog food shall be stored in bear-proof containers. Owners acknowledge that wildlife damage landscaping and accept this risk and agree not to file claims against the Declarant or other governing body for such damages.
7. MBR will provide technical advice in the form of direct communication and resource information to inform and assist landowners in their efforts to reduce impacts on wildlife and minimize human/wildlife conflicts.
8. Owner and guest use of key wildlife areas will be regulated when and where necessary to minimize potential conflicts with wildlife. Examples include avalanche chutes in spring, willow stands, marshes and meadows in spring and summer, key nesting areas, calving areas and brood rearing areas.
9. A professional wildlife biologist has, and will continue to be, involved in design of any proposed development or significant management action.

1-H: Historical Features

The State Historic Preservation Office has done a preliminary search of Moonlight Basin and found that there are no known historic, archaeological or cultural sites that may be affected by the proposed subdivision. Much of Moonlight Basin has been logged by previous owners and has also sustained forest fires in the past 20 years, both of which have greatly disturbed the area.

During development, construction activities at the site will be monitored for historical, archaeological or cultural sites. In the unlikely event that any such sites are discovered appropriate measures will be taken to respect the site and/or artifacts. (See Appendix J for the cultural resource study provided by InteResources Planning, Inc.)

Chapter 2 .Community Impact

2-A: Community Water Supply

Groundwater resources within Moonlight Basin are not well-suited to numerous individual wells. The heterogeneity present in the aquifers does not provide a continuously available water supply throughout the development area. Where tracts are large, such as the Reserve Ranches, this is not a significant problem. However, on smaller lots the potential exists for groundwater resources within the lot bounds to be inadequate for an individual well. For this reason, the existing and proposed development is best served by a public water supply system that can develop water supplies in the areas most suited and deliver water to individual lots. Furthermore, individual water supplies would not provide adequate fire protection for the larger multiple-unit structures proposed in the high-density development areas.

The existing water system will be expanded to serve future development shown on the ODP. Water supply at Moonlight Basin is currently provided by Treeline Springs, a privately-owned public water and sewer utility (PWSID #4023). The existing service area consists of the Saddle Ridge Townhouses, multiple phases of Cowboy Heaven subdivisions, and Moonlight Basin Ski Area and Golf Course Facilities. Existing and proposed future water supply improvements are shown on the Water System Master Plan (*see Figure 14*).

Treeline Springs Existing System

The existing water system can be supplied by five wells (three of which are currently connected) that feed a 318,000-gallon storage tank located above the service area. The five wells supply 426 gallons per minute (gpm) to the system. Water is distributed by gravity through 10" trunk lines and 6" and 8" distribution lines. The existing distribution system contains approximately 33,000 feet of water main.

Fire protection is provided by fire hydrants on the water mains. Fire flows range from 1500 gpm for a residence up to 2500 gpm for a larger structure. Typically fire flows for residences can be met with a single 8" water main. Larger fire flows require either an 8" looped main where water can approach from two directions or a single 10" main. Fire flow requirements have been considered in the water main layout so all hydrants can provide the required fire flows.

Beneficial Water Use Permits # 41H-99524, # 41H-3005212, and #41F-30013630 describe the water rights available for Treeline Springs. The existing water rights are for 300.1 acre-feet of water per year, equivalent to 97.8 million gallons per year. Water use was measured at 68 acre-feet for the 2007 water year. Annual water use for Moonlight Basin is lower than typical residential

developments because design guidelines encourage native vegetation and small lawns, reducing irrigation requirements. Proposed System Expansion

The existing water supply and distribution system will be expanded to serve the additional development in the ODP. Water supply will be increased by 6 new wells with a combined flow rate at least 800 gpm. These wells will supply both the existing water storage tank and a proposed new storage tank above the golf course area. Water rights for the new wells are currently being pursued. Estimated peak flows and domestic water supply requirements are shown in Table 5. The combined existing and future wells water supply will exceed the maximum daily needs, with sufficient redundancy to satisfy Montana Department of Environmental Quality (MDEQ) requirements.

Operation and maintenance of the existing water system is financed by monthly charges to the homeowners. Billing rates are reviewed by the Public Service Commission.

Table 5. Estimated Domestic Water Supply Requirements

	RSF Lots	Cabin/Villa	Condo/TH	Hotel/Lodge	Employee Housing	Commercial Facilities	Total
Domestic Water Use							
# Units	414	357	344	434	200	1	
Max Day (gpd/unit)*	446.3	446.3	446.3	250	200	80,000	
Max Day (gpd)	184,785	159,344	153,541	108,500	40,000	80,000	726,170 gpd
Annual Use (acft)**	103.5	89.3	86.0	60.8	22.4	44.8	406.7 acft
Lawn and Garden							
L&G sf/unit	8,000	4,000	2,000	1,000	1,000		
L&G Acres	76.0	32.8	15.8	10.0	4.6	15.0	154.2 acft
Gpd (90 day season)	389,957	168,134	81,006	51,099	23,548	76,932	790,676 gpd
Annual Use (acft)	107.7	46.4	22.4	14.1	6.5	21.3	218.4 acft
Snowmaking							
Annual Use (acft)						50.0	50.0 acft
Total Annual Use (acft)							829.3 acft
Max Day Use							1,153,761 gpd
(50% Domestic + 100% Irrigation)							801 gpm

Proposed main extensions are shown in the Water System Master Plan (see *Figure 14*). New water mains will consist of 10" and 12" trunk lines with 8" distribution lines. Additional distribution mains, not shown on Figure 14, will be constructed in each of the development areas as future subdivisions are laid out. All new water mains will be designed to supply the required fire flows of 1500-2500 gpm to hydrants throughout the development.

All new water supply improvements will be reviewed by MDEQ as required for future subdivisions. Similar to municipal extensions, installation costs are financed

by Moonlight Basin Ranch, L.P. (the developer) and then “turned over” to Treeline Springs (the system owner) for operation.

2-B: Golf Course Water Supply

Irrigation water for the Reserve golf course is supplied by a combination of surface water diversion, recycled golf course drainage, treated wastewater effluent, and groundwater wells. Fairways have been laid out to utilize natural landscape features and native vegetation as much as possible to reduce the turf area required. Native vegetation adjacent to the golf course will not be irrigated. A total of approximately 82 acres of turf (including greens and tees) will be irrigated. Typical irrigation rates are 18 inches per year with as much as 24” inches required for the first year or two. Maximum water needs are 164 acre feet per year with average uses around 123 acre feet per year.

Surface water will be diverted from Lone Creek during periods of high flows and stored in lined ponds for irrigation at a later date. Water right #41F 30013631 allows a maximum diversion of up to 2.0 cfs from approximately May 25 to June 26, for a maximum diversion volume of 119 acre feet.

Golf course turf drainage lines will be installed under tees, fairways, and greens to reduce soil saturation after storm events and snowmelt. Where practical this drainage water will be recycled into the lined storage ponds for reuse later in the irrigation season. It is estimated that approximately 20-30% of the water can be collected and reused for irrigation.

Treated wastewater is also proposed for golf course irrigation. The total volume of treated wastewater varies considerably from year to year depending on the number of guests and homeowners. During initial years the volume of treated wastewater will only make up a portion of the golf course needs. As development progresses the treated wastewater will be able to fully supply the golf course needs and surface water diversion from Lone Creek will not be required. Wastewater will be highly treated and stored in lined ponds as it is generated throughout the winter. Prior to irrigation, the treated wastewater will be micro-filtered by a membrane filter and disinfected. Micro-filtration removes suspended particulate matter and most of the bacteria, allowing much more effective disinfection. Treated wastewater undergoing a similar process is currently utilized for golf course irrigation at two of the golf courses in the Big Sky area.

2-C: Wastewater Treatment

As previously described, Moonlight Basin property is served by Treeline Springs, a privately-owned public water and sewer utility. A wastewater treatment Facility Plan was completed for the Treeline Springs service area within Section 24 of Moonlight Basin in 2002. The service area within Section 24 consists of Saddle

Ridge Townhouses, all phases of Cowboy Heaven subdivisions, and Moonlight Basin Ski Area facilities.

The existing collection and treatment systems will be expanded to serve future development areas shown on the ODP. Existing and proposed future wastewater collection and treatment improvements are shown on the Wastewater Collection/Treatment Layout (see *Figure 15*).

Individual on-site wastewater systems are proposed for the Reserve Ranches only. These lots will be large enough to enable on-site systems to meet the required location constraints. The proposed on-site systems will be pressure-dosed and sand-lined, and provide reliable treatment of wastewater.

In order to accommodate the ultimate development illustrated by the ODP, a new wastewater treatment facility is planned. This facility will combine biological activated sludge treatment with membrane solids separation through the use of “membrane bioreactor” technology. In general terms, treatment will be provided through a modified conventional biological process followed by effluent filtration and polishing through a membrane process. The filtered effluent will be disinfected with UV disinfection prior to discharge to reuse applications.

In order to serve the additional development outlined by the ODP, new collection lines need to be brought into the existing service area. Some of the proposed development can be served by gravity sewers connecting to the existing sewer system. Wastewater from new development areas downhill of the treatment plant will be collected in new gravity sewer lines to lift stations and then pumped to the treatment plant. The location of proposed new sewer forcemains and treatment facility are shown in *Figure 15*.

Treated wastewater is stored in lined ponds until irrigation season. Currently, treated wastewater is spray irrigated on a young forest growing in a past “clear-cut”. After construction of the golf course, the treated wastewater will be used to supplement irrigation needs on the golf course. Wastewater irrigation on accessible land requires purification and disinfection of the effluent. Particulate matter such as algae and suspended solids are filtered out of the effluent prior to disinfection. Micro-filtration with a membrane filter is currently proposed to remove all but the smallest particles and bacteria. This high degree of filtration allows much more effective disinfection with a lower concentration of oxidizer.

Golf course irrigation by treated, filtered and disinfected effluent is currently used at the Big Sky and Yellowstone Club golf courses and has been shown to be a beneficial reuse of reclaimed water.

All new wastewater treatment facilities and collection lines will be reviewed by Montana Department of Environmental Quality as required for future subdivisions. Similar to municipal extensions, installation costs are financed by

MBR (the developer) and then “turned over” to Treeline Springs (the system owner) for operation.

2-D: Solid Waste

MBR in conjunction with the Madison County Sanitarian has formed a private solid waste collection area. Solid waste from all of the Moonlight Basin developments is brought to a centralized compactor/container near the entrance of Moonlight Basin. Allied Waste Services is our current waste hauler for both municipal solid waste (compactor) and construction waste (depending on contractor). Allied uses a roll off truck & container system which consists of 30 and 40-yard steel containers and one rented industrial sized stationary compactor. Currently, all 30-yard containers are on an on-call service and one 40-yard closed top container for the compactor serviced every Thursday during peak season and every two weeks (or on call) during the off season. Allied Waste has a Public Service Commission permit to haul all types of waste:

PSC NO. 1581

Allied Waste Services of North America LLC

1501 Rodgers, P.O. Box 8449, Missoula, Montana 59807

Class D - Garbage and refuse between all points and places in the following counties: Gallatin, Madison, Park, and Sweet Grass. Carrier is allowed to transport authorized commodities to certified landfills from territory authorized.

The new development areas will continue to utilize the existing waste compactor and storage container. At the centralized compactor facility, waste is compacted and stored in a sealed bear-proof container. The collection and storage facility is convenient and can be used by paying residents of Moonlight Basin property. This reduces the possibility of bears or other wildlife being exposed to individual on-site garbage containers at the homes or as they are waiting to be picked up. No on-site disposal of solid waste is permitted at any of Moonlight Basin developments.

Moonlight Basin is currently working with local organizations regarding construction waste recycling and other ways to divert waste from our local landfills. Moonlight Basin also contracts Four Corners Recycling to haul and process recyclables.

2-E: Drainage

Storm drainage at Moonlight Basin is grouped into 10 project areas; the ski area, golf course, Cowboy Heaven Subdivision, Lee's Pool Wetland project, Riverwood Mitigation Project, Entranceway Subdivision, Moose Creek Subdivision, Front 9 Subdivision, Madison and Jack Creek Road Construction and the Wastewater Treatment Plant construction site. Storm drainage for the ski area and golf course are only regulated during the construction phase since both have

negligible storm water impacts once re-vegetation has taken place. Due to the impervious areas created by roads and buildings, storm drainage improvements for development areas and roadways are regulated both during and after construction. Because of the sloped terrain, flooding due to storm drainage is not a concern. The most significant concern with storm drainage at Moonlight Basin is the associated erosion and sediment transport caused by runoff which, if improperly treated could decrease water quality and fish habitat downstream.

Each of these project areas currently has a Montana Department of Environmental Quality (MDEQ) permit for “Storm Water Discharge Associated with Construction”, regulating storm water measures to be used during construction. These permits describe “Best Management Practices” (BMPs) utilized to prevent erosion and water pollution and to establish final vegetation as soon as possible after construction. The permits are updated annually and can be terminated once the disturbed areas are re-vegetated and the risk of erosion is lowered. The BMPs utilized at Moonlight Basin include: water bars and silt fence to prevent erosion and sediment transport; detention basins to slow down runoff and capture sediment; annual seeding of disturbed areas to stabilize disturbed soils; and erosion control fabric to cover and protect sensitive areas until vegetation is established.

In addition to the construction storm water permit described above, each of the future development areas will have permanent storm water improvements evaluated by MDEQ during the subdivision review. Paved access roads and buildings cause increased runoff within the development areas. Typically, storm drainage improvements consisting of culverts and drainage ways collect storm water from impervious areas and direct runoff to detention basins. Detention basins hold the increased storm drainage and trap any sediment before water overflows into existing drainage ways. Furthermore, paved roads and landscaping used in development areas greatly reduces erosion and improves storm water quality by reducing bare soil exposure.

2-F: Roads

Existing and Proposed Access Roads

Access is provided to Moonlight Basin by existing public and private roads. The Moonlight Basin entrance is accessed from the east by a 32-foot wide, paved Madison County road which is an extension of State Highway MT 64 (Lone Mountain Trail). Jack Creek Road, a private, gated road from Ennis provides secondary and emergency access from the west. Existing and proposed access roads are shown on the Traffic Circulation Plan (see Appendix F).

Jack Creek Road has been straightened and widened to provide improved travel. This road is available for use by all residents living along it, and employees living in Ennis and working at Moonlight. Jack Creek Road will remain a privately

owned road and will continue to serve as an emergency escape route that is open year-round.

Access roads to existing development within Moonlight are paved with a 24-foot wide surface. Proposed access roads to development areas shown on the ODP will be paved (24 feet wide) at the time of subdivision. Summer access roads will remain gravel surfaced (26 feet wide). Proposed road improvements will be financed by the developer.

Access roads within Moonlight are privately owned, and maintained by MBR. Access and use is granted by easement to all lot owners in Moonlight. All access roads are open year-round except those that cross the ski terrain in the winter. Seasonal roads are open from May 1 to Oct 31. An emergency access is provided from the west end of the development area to Jack Creek Road.

Traffic Generation

Traffic in Moonlight Basin is generated by homeowners, day-use visitors for golfing and skiing, and users of commercial units. Day-use visitors and a portion of the homeowners' trips will generate both interior and off-site traffic. The commercial units are proposed to provide local services (food and retail) to the developments at Moonlight. Nearly all users of commercial units will be from on-site and only partially contribute to off-site traffic. To reduce internal traffic, a shuttle service between development areas and commercial sites is available for guests of Moonlight properties. Day use skiing traffic will be routed at the entryway to the required parking lot, where skiers can ride a shuttle to the ski area.

A summary of the average daily trip generation calculations and detailed traffic generation tables and figures is provided in Appendix F, along with an updated Traffic Study by Marvin & Associates which relates directly to the approved 2007 ODP.

The traffic will be split approximately evenly at the entrance to Moonlight Basin, with approximately ½ going south and west to Section 24 and ½ going north to the future development. Because of the concentration of traffic, the entryway is being redesigned. The new entryway layout is shown on the Traffic Circulation Plan in Appendix F.

Existing and New Road Capacity

Detailed road capacity analysis is provided in the Traffic Study Report attached as Appendix F. Capacity of the roads, as a system, is limited by the capacity of a few of the busiest intersections. Specifically, two intersections at the entryway were analyzed for conditions at peak morning and afternoon traffic. The intersection of the entryway loop and Jack Creek Road carries approximately 524 trips, and 730 trips during the peak AM and PM hours. The intersection of the proposed entryway loop and Mountain Loop Road and Diamond Hitch Road

carries approximately 125 trips, and 967 trips during the peak AM and PM hours. Note the PM trips would decrease dramatically if shuttle services were considered.

Capacity calculations for these intersections were completed for two conditions; one-way traffic around the entryway loop and two-way traffic around the entryway loop. The functionality of intersections is described by Level of Service (LOS) which analyzes factors such as traffic volume, speeds, geometry and expected delays. LOS is graded from A to F, with A to C being considered acceptable, LOS D-E is unacceptable, and F is failing. LOS determinations for the entryway intersections are shown in Appendix F.

Off-Site Road System

With the exception of employees driving from Ennis and a few year-round residents, all of the traffic will access Moonlight Basin from the Lone Mountain Trail. Moonlight Basin property is included in the Rural Improvement District that maintains the County Road extension of Lone Mountain Trail to the entryway into Moonlight Basin.

Based on the regional trip distribution provided in the traffic study, the existing and proposed Moonlight Basin developments will add approximately 9,427 average weekday trips to the Lone Mountain Trail (MT 64). Montana Department of Transportation (MDT) has been contacted regarding future improvements at the intersection of MT 64 and US 191 and safety & capacity improvements are currently under design. The improvements include two left turn lanes for the west leg of the intersection, right turn lanes for the north and west legs of the intersection and the bridge north of the intersection will be replaced to accommodate the two northbound lanes. Construction is anticipated for 2008 – 2009. With the anticipated improvements, this intersection will have a LOS C rating both with and without the added traffic from Moonlight Basin.

In the event of a natural disaster or emergency closing Lone Mountain Trail, Moonlight Basin residents and guests could exit the property down the Jack Creek Road to Ennis.

2-G: Utilities

Existing utility providers have infrastructure in place for power and phone. Other utilities such as natural gas and cable TV are not available in Big Sky. Local utility providers have been contacted regarding service to new development areas shown in the ODP.

Phone and power utilities have been installed to existing developments and ski area facilities in Moonlight Basin. Extensions of these utilities will be provided to new development areas outlined in the ODP. Phone and power are installed

underground and paid for by the developer. Phone service is provided by 3 Rivers Telephone Co-op, and power is provided by Northwestern Energy. Underground propane tanks are usually installed near individual buildings. Amerigas, a propane distributor, operates a supply hub near the Moonlight Lodge parking lot. This large storage tank is used to fill up smaller delivery vehicles which fill up individual tanks in the area, reducing delivery trips significantly.

Utility extensions for each future subdivision phase typically occur immediately after water and sewer mains are installed, and prior to road paving.

2-H: Emergency Services

All lots in Moonlight Basin will be addressed and identified in accordance with the E911 addressing system. Accurate addresses will enable emergency response providers to respond precisely to distress calls at any location.

Fire protection is provided by the Gallatin Canyon Rural Fire District (GCCRFD). All of Sections 24 was annexed into the District in 1995. The District's main fire station is located in the Meadow Village approximately 8 miles from Cowboy Heaven. The newly constructed fire station in the Mountain Village is approximately one mile from the entrance to Moonlight Basin. In addition, Moonlight Basin has a quick-response fire truck and red-card trained employees on site.

The existing public water supply and distribution system that serves Cowboy Heaven has been designed to accommodate fire flow demands. The 318,000 gallon water storage tank stores more water than the maximum day demand from all the existing and proposed development plus a sustained 2 hour, 1500 gpm fire flow. Existing water mains and proposed extensions of these mains will carry all anticipated fire flows to fire hydrants located throughout the development. The GCCRFD will be consulted for fire hydrant placement prior to the design of each phase.

The Overall Development Plan for Cowboy Heaven Phase 2 through 4 was provided to John Allhands, the Madison County Fire Prevention Specialist and to Mr. Bob Stober, Fire Chief, for their comment and review. MBR continues to work closely with the GCCRFD to ensure the fire district needs are met.

Police protection is provided by the Madison County Sheriffs office. The Madison County Sheriff works cooperatively with the Gallatin County Sheriff in the Big Sky area. Ambulance service in the Big Sky community is provided by the GCCRFD.

The nearest hospitals are in Ennis, approximately 25 miles via the private Jack Creek Road, or in Bozeman, approximately 50 miles. There is a small medical clinic at the Mountain Village in Big Sky. A letter from Firescope Mid-America,

attached as Appendix H, outlines the impact of the ODP on local emergency services.

2-I: Education and Busing

Moonlight Basin is located in the Ennis School District. However, the District has agreements with the Ophir School District in Big Sky and the Bozeman High School District for children residing in the Big Sky area to attend these schools. Ophir School is located about 14 miles from the development while the Bozeman High School is approximately 50 miles. The homes in Moonlight Basin are expected to be used by owners on a second or vacation home basis or perhaps they will be made available through a rental pool to short-term visitors to Big Sky.

2-J: Land Use

In 1992 the Moonlight Basin property was purchased as a 25,000-acre tract from Plum Creek. Historically much of the land has been logged by the previous owners.

Limited portions of Moonlight Basin have been developed since 1994. These cluster developments, occurring near the Big Sky Ski & Summer Resort, transpired in accordance with the original Master Plan provided to Madison County in 1994. The majority of development has centered on Section 24, with the exception of 20-acre lot subdivisions of Ulery's Lakes and Timber Ridge subdivisions to the north-east. The Diamond Hitch subdivision consists of 47, 1-acre home sites, the Saddle Ridge Townhouses consist of 85 townhouses, and Cowboy Heaven Phase 1-3 consists of 236 mixed-use units (home sites, cabins, and townhouses). These developments have achieved the goal of establishing environmentally friendly cluster developments that protect sensitive areas of vegetation and wildlife habitat through open space corridors.

The ODP will expand the ski area north from the Big Sky Ski & Summer Resort located to the south. This expansion will include new lifts and runs. A golf course is also proposed, attracting tourism during the non-skiing seasons.

Moonlight Basin is surrounded by privately owned lands, and therefore will not affect the accessibility to public lands.

The only man made hazard present on the site is a high-voltage overhead power line of Montana Power that runs from Ennis to Big Sky, passing through Jack Creek. The power lines run through designated open space and will remain so. Where applicable, residences have been set back from this energy corridor. Possible future uses of the corridor include ski trails and summer spray irrigation of wastewater.

The developer will pay for the cost of providing roads and utilities within the subdivisions. These developments should generate sufficient property taxes to cover any local services required.

The proposed land use within Moonlight Basin includes residential, commercial, and recreational developments. Covenants are in place to protect wildlife, including the following: bear-proof garbage containers must be used; to protect the free movements of wildlife, fencing is not allowed; and, domestic animals must be in control at all times.

2-K: Parks and Recreational Facilities

The world class year-round recreational opportunities at the Big Sky Ski & Summer Resort and Moonlight Basin Ranch Ski Area have contributed significantly to the national visibility and the recent surge in demand for real estate in the area. The economic development associated with the recreational amenities would be difficult to measure, but it is certainly a primary catalyst. There are nearly too many active and passive recreational opportunities to choose from for the outdoor enthusiast. Moonlight Basin's mission to preserve the scenic beauty and open space while creating the finest year round resort is highlighted by the preservation of the wild lands that contribute to an experience unsurpassed in other ski areas around the country.

MBR has a commitment to provide and enhance the following recreational amenities:

1. World class ski terrain (new lifts and runs currently in design)
2. Cross country skiing
3. Golf
4. Snow shoeing
5. Comprehensive hiking trails with connectivity off-site
6. Mountain Biking
7. Fishing
8. Wild-life and bird viewing
9. Rock climbing
10. Interpretive trails
11. Dog-Sledding
12. Sleigh rides
13. Triathlon host
14. Athletic and recreation facility

MBR has a history of open space preservation. The recreational opportunities that are provided as a result are paramount to maintaining the extraordinary experience that exists. The design approach is to maintain a "national park" like

feeling of open space with the development clusters minimizing the visual and physical impacts overall. This hierarchy of preservation of open space places the emphasis on recreation as opposed to the built environment. MBR sees this as fundamental to their success as well as representative of their land stewardship. The proposed future phases into the basin area will allow public access into some of the most scenic and visually spectacular vistas that Montana has to offer. Perhaps many owners would hold this treasure close to the vest and maintain private access only to this wonderful place while maximizing development value and investment return. MBR's willingness to share this extraordinary place with everyone denotes their understanding of this important legacy.

Recreation and open space are the primary land-uses Moonlight Basin. The growth of the resort overall will allow and provide for generations to enjoy this wondrous place. Even at build-out, the identity of Moonlight Basin will largely feel like an accessible, open, back country park experience. The owners and design team are working hard to preserve all that makes this place unique while creating an experience unlike any ski area in North America.

Chapter 3 . Public Interest Criteria

3-A: Effect on Agriculture and Agriculture Water Users

The project area has not been utilized for crop production. Portions of the Moonlight Basin property were historically used for summer cattle rangeland. These areas were primarily located along Jack Creek and in the western quarter of the project boundary. Overall, the land cover is primarily forested with a lower percentage as open meadows and montane grasslands appropriate for seasonal grazing. Cattle grazing will not continue within the Moonlight Basin property, however, grazing within private property along the Jack Creek Road right-of-way west of the cattle guard in Section 33 will continue. There is a possibility that a small number of horses will graze select areas within the Moonlight Basin property.

Logging was another historic agricultural use. It is difficult to discern the total acreages logged due to additional impacts from historic prescribed fire and wildfire. Using the land cover maps and aerial photographs, over 50% of the forested area has been logged in the past 30 years. Plum Creek logged areas including old growth lodge pole pine, subalpine fir and Douglas fir at low to moderate elevations.

There are no agricultural water use facilities, such as irrigation ditches, impoundments, or reservoirs on site. The proposed Moonlight Basin land use will not affect the use of resources on any adjacent properties. Expansion will not conflict with down-gradient agricultural operations.

Water supply at Moonlight Basin will be developed with consideration of effects to existing water users. Water will be extensively reused to reduce new demands. All of the wastewater will be utilized to offset irrigation uses on the golf course, and water collected from the golf course turf drainage systems will be recycled to lined storage ponds for reuse later in the irrigation season. Large storage ponds allow water for golf course irrigation water to be diverted only during high stream flows, early in the season, when irrigation demands are low. To further reduce irrigation needs golf course turf areas are kept small and native vegetation will not be irrigated.

The Department of Natural Resources and Conservation (DNRC) has reviewed water right applications for the golf course and existing as well as proposed community water supplies. As part of the criteria for permitting new water uses over 10 acre feet per year, the DNRC reviews availability of water and if diversions will adversely impact senior water users. Mitigation plans will be implemented to offset any impacts to senior water rights. The surface water

diversion occurs during spring runoff when excess water is available in the stream.

3-B: Effect on Local Services

Connection to existing community water and sewer systems

Future development within Moonlight Basin will be served by connections to existing community water and sewer systems. Capital improvements expanding the capacity of the community systems will be required to serve these new development areas. All capital improvements will be financed by the developer. Operation and maintenance costs are provided by user fees.

Additional Traffic

The development shown on the ODP will generate approximately 9,427 average weekday trips (ADTs). See Appendix F for the current Traffic Impact Analysis provided by Marvin & Associates. Local roads were analyzed to determine if additional capital improvements are necessary. The main entryway is being redesigned to accommodate the additional traffic. All capital improvements will be financed by the developer.

MBR employees, as well as subcontractors who use the Jack Creek Road, are required to carpool. Employees are also offered incentives to carpool to work. Occupancy of all Moonlight vehicles traveling to and from work is maximized. Moonlight has also purchased a thirty-seat bus that runs from the Bozeman area to Moonlight daily. In addition, two vans are used for shuttling employees from the Madison Valley.

For the 2006/2007 ski season, Moonlight Basin sponsored the Skyline Bus to provide year-round public transportation in Big Sky, with service between Bozeman and Big Sky during the winter season. Moonlight Basin's sponsorship of the transportation system guarantees the service between Bozeman and Big Sky will be free for all riders. The 47-seat motorcoach (bus) makes six round trips from Montana State University to the Mountain Village Center and Moonlight Basin, making several stops along the way--7 days a week. Karst Stage of Bozeman operates the buses on behalf of the Transportation District.

Limits of Service Capability and Adequate Utility Service

It is unlikely that the future development shown on the ODP will put local services at or over their capacity. Local services such as water supply, wastewater treatment, and road construction and maintenance are provided and financed by the developer. Due to the recreational use of the properties, other service requirements are less than that of year-round residences. For example, the impact to local schools is much smaller since the number of year-round residents is very low. Similarly service requirements to law enforcement, fire and ambulance providers are also lower than year-round residences.

Requirements of local law enforcement, fire district, quick response unit, ambulance service and school district.

MBR has been working closely with Chief Jason Revisky of the Gallatin Canyon Consolidated Fire District (GCCRFD), as well as Chief Doug Forsman with Firescope Mid-America, in working towards a proposed annexation of the remaining Moonlight property into the Fire District. MBR has discussed annexation with the Fire District Board at several of their monthly meetings this year, as well as taken the Board members on a tour through the proposed annexation areas. MBR will be working with GCCRFD to have the remaining property annexed into their district by the end of 2008. A letter from Firescope Mid-America, attached as Appendix H, outlines the impact of the ODP on local emergency services.

Costs of extending utilities will be financed by the developer. Local providers of power, telephone and solid waste disposal were contacted with regard to their ability to provide service to the future development areas shown on the ODP.

Annual Property Tax and Increased Revenues to Local Government

A letter has been sent to the county tax assessor's office, and we have not received a response. Responses from these organizations had yet to be received at the time this document was prepared, but will be forwarded to the Madison County Planning office when they are received.

Affordable Housing Stock

MBR is currently working with Dab Dabney and an architect named Thomas Bitnar on our Ambassador Housing. The location of the main body of Ambassador Housing is near the entrance, behind the Ski Administration Building. Currently, the schematic designs on the apartment style units are complete, and the site plan is nearing completion. MBR is hoping to have this as Moonlight's first LEED certified project. Affordable employee housing is also being made available in the Golf Maintenance Shop which will contain four apartments that will house a total of eight employees.

3-C: Effect on the Natural Environment

Surface water quality

Potential environmental consequences of the Moonlight Basin development to surface water resources include increased sediment loads, increased nutrient loads and a loss of riparian vegetation. In order to document potential changes in water quality due to upstream development (and to provide an avenue for potential remediation in the case of documented pollution) Moonlight is currently sponsoring and facilitating the Jack Creek Monitoring project (see section 1-B).

Increased Sediment Loads

Sediment loads, both within Jack Creek and the Madison River, may increase if Best Management Practices (BMPs) are not followed during road building, ski run development, golf course development, residential and commercial development and other construction activities. Any activity which disturbs the ground may potentially lead to increased sediment loads to the stream channel. Increased sediment loads can lead to an increase in the amount of fine sediment in spawning gravels and a decrease in sensitive fish species over time. This is of special concern since Jack Creek is currently listed as impaired due to sediment by the Montana Department of Environmental Quality (MDEQ) based on existing data and a 1999 stream assessment, which indicted that logging roads and eroding banks were a source of sediment to Jack Creek (MDEQ 2000).

Increased Nutrient Loads

Potential impacts include a possible increase in nutrient loads to Jack Creek and its tributary streams due to septic systems, land application of wastewater and golf course runoff. The potential for nutrient pollution increases when development is situated adjacent to a stream channel. Recently collected data by MDEQ suggest nutrients are not currently a problem in Jack Creek. During monitoring in 1999, chlorophyll *a* samples, which are a measure of in-stream nutrient uptake by algae, revealed a concentration of 15.2 mg/m² at site J-1 and 15.9 mg/m² at site J-4. Total nitrogen and total phosphorus within the water column reportedly did not exceed target levels, though targets were not presented (MDEQ 2000).

Loss of Riparian Vegetation

The loss of riparian vegetation due to clearing for ski runs, commercial and residential development and the golf course is a potential concern with the Moonlight Basin development. Riparian vegetation helps hold the streambanks in place and is a main component in habitat features necessary to maintain a healthy fishery. A loss of riparian vegetation can lead to bank erosion and channel widening. Riparian vegetation also acts as a buffer that prevents hill slope erosion and nutrient runoff from reaching the stream channel.

Mitigation

The primary way in which the above listed potential environmental consequences will be mitigated is through avoidance of development adjacent to surface water features. When not feasible to completely avoid surface water features, all appropriate BMPs will be applied.

Best Management Practices

The implementation of BMPs during development should limit or prevent increased sediment loads into streams of the Jack Creek watershed. BMPs will be geared toward covering exposed soil and diverting runoff during and immediately following construction. BMPs will include, but are not limited to, the use of waterbars, sediment traps, silt fence, slash windrow filters, vegetative

buffer strips, erosion control blankets, seeding and maintenance of natural vegetation. In addition, all stream crossings will be developed using appropriately sized culverts.

Effects on Groundwater Quality

As provided in the environmental description, two groundwater regimes (shallow and deep) exist at Moonlight Basin. The shallow groundwater regime (where present) is the most susceptible to contamination. However, due to the shallow depth and interactions with wetlands, the shallow groundwater regime is well buffered from low-intensity, indirect impacts. The deeper groundwater regime is not very susceptible to impacts since it is confined by thick shale beds, and recharge areas are located higher up the valley slopes than development areas.

For the most part, areas of the property with a shallow groundwater regime will be avoided and not intensively developed. The shallow groundwater is not utilized for water supplies or other diversions, so direct impacts to ground water quality are not anticipated. The presence of shallow groundwater precludes the use of on-site wastewater systems in these areas. Potential indirect impacts to the shallow groundwater system are limited to occasional wetland crossings by roads and trails, and fertilization on nearby golf course fairways.

Mitigation of potential indirect impacts consists of several measures. BMPs are utilized during construction to improve storm water quality before percolating to the shallow groundwater. In order to protect groundwater from accidental fuel and lubricant spills, MBR is implementing a Spill Prevention Plan. To reduce nutrient losses, golf course fertilization will be monitored as part of a comprehensive nutrient management plan.

The golf course nutrient management plan will target fertilizer applications with the goal of no net loss of nutrients to the groundwater system. Some nutrients will be supplied by reuse of treated wastewater for golf course irrigation. However, since wastewater reuse will account for only about 30% of the irrigation needs, nutrient availability in treated wastewater alone will be insufficient for plant needs. Typically, fertilizer applications will be specifically determined to make up for the deficiencies and supply a complete suite of nutrients to the turf. A well monitored nutrient management plan will provide healthier turf, lower costs by avoiding over fertilization, and reduce any nutrient loss to the groundwater system.

Soil Erosion Potential

The soil erosion potential is moderate for the soil units present at Moonlight Basin, due to steep slopes present within the soil unit boundaries. The development clusters have been located away from the steepest portions of the property to reduce construction on steep slopes. Erosion control is extensively implemented at Moonlight Basin through the use of BMPs and revegetation as soon as possible after construction.

Physical, chemical and microbiological changes to area soils would occur from the development expansion. The physical effects from the loss of vegetation cover and subsequent soil erosion are expected to be short-term, lasting only until vegetation is re-established. Short-term effects include soil erosion and runoff as a result of compaction. Long-term effects include loss of soil productivity and increased erosion and runoff potential as a result of the compaction of soil. Exposure of high coarse fragments or clay-rich soils can also affect the re-establishment of vegetation. Changes to the chemical and microbial soil characteristics will be minor. Soil removal, horizon mixing, and prolonged stockpiling affect soil chemistry and microbial activity. These potential impacts to the soil resource will be effectively mitigated through implementation of the erosion control measures and prompt reseeding and/or landscaping by MBR. Physical effects can be mitigated effectively through implementation of a Stormwater Management Plan and the use of BMPs and standard revegetation practices. MBR has successfully implemented both these plans from previous developments. Implementation of plans on the proposed development will limit exposure of disturbed areas of a site to the shortest duration possible, divert runoff from upslope construction around and away from construction sites until they are stabilized and address methods for removal of sediment from stormwater before it leaves the area. Areas identified with a potential for slope failure have had onsite prior geotechnical studies and development within potentially hazardous areas have been moved or removed from consideration.

BMPs will include timing of construction activities when soil moisture levels are low, installing sediment fences during construction, minimizing slope length and concave slopes in developed housing areas, ripping soils on the contour prior to reseeding, application of mulch during or following seeding and the rapid re-establishment of vegetation. The use of clay-rich subsoil for coversoil will be avoided. Employment of BMPs will also minimize wind erosion, although due to the site physiography and prevalent soil textures this is not considered to be a problem.

Chemical changes to the soil from removal and mixing of soil horizons is unlikely to substantially affect the fertility of the soil. Decreases in microbial activity as a result of removal or prolonged stockpiling of topsoil can be remedied through a combination of the use of fertilizers (nitrate) to aid in the re-establishment of a microbial community as well as through natural propagation of the soil by microbes from adjacent areas. The impacts to chemical and microbiological characteristics of the soil are expected to be low.

Individual on-site wastewater systems are proposed for the Reserve Ranches and several other developments. On-site systems are proposed for these lots due to the large lot size envisioned. Soils in the these development areas have deep, well-drained soils suited to individual on-site systems. Use of centralized wastewater collection and treatment for the majority of the development will

preclude impacts to the soils associated with septic systems. The wastewater system for the proposed homes on the Reserve Ranches will be a conventional pressure drainfield which may increase nutrient loading to the soil in a very localized area but is not considered to be a significant impact .

Surface Water Run-off

The subdivision design emphasizes clustering development and avoiding sensitive drainage areas. Development is setback from surface water allowing a substantial vegetative buffer between runoff producing areas and surface waters.

All construction areas are subject to MDEQ permitting for “Storm Water Discharge Associated with Construction”, which regulates storm water measures to be used during construction. These permits describe “Best Management Practices” utilized to prevent erosion and water pollution and to establish final vegetation as soon as possible after construction. The BMPs utilized at Moonlight Basin include: water bars and silt fence to prevent erosion and sediment transport; detention basins to slow down runoff and capture sediment; annual seeding of disturbed areas to stabilize disturbed soils; and erosion control fabric to cover and protect sensitive areas until vegetation is established.

MDEQ reviews storm drainage within subdivisions. A grading and drainage plan is submitted with each development phase. Typically, storm runoff is managed with culverts and drainage ways collecting storm water from impervious areas and directing runoff to detention basins. Detention basins hold the increased storm drainage and trap any sediment before water overflows into existing drainage ways.

Vegetative Health

Direct impacts to plant communities will occur as a result of vegetation removal due to ground disturbing activities, temporary loss of productivity, increased risk of weed infestation, soil compaction and an increased risk of soil erosion prior to vegetation establishment. The primary cover type impacted by the development clusters, parking lots, proposed road and existing road improvements, ski runs and golf course construction will be parkland and meadow (historically logged/fire areas).

Indirect impacts will result in the long-term loss of forested ground. Timber productivity for mix subalpine fir is rated as low to moderate. Lodgepole pine offers the greatest potential for timber management within the proposed project area and represents a very small portion of the proposed disturbance. Subalpine fir cover types are very common in Montana, particularly in the Beaverhead Forests. The removal of the regeneration timber or removal of timber in areas not logged throughout the overall development area would have a minor effect on forest diversity, timber production and overall land use. The creation and maintenance of alpine ski trails will result in permanent changes to the vegetation communities, altering forested cover to herbaceous cover.

Native vegetation will be preserved to the maximum extent possible. Adverse environmental impacts will be mitigated by several measures. Prompt revegetation of all disturbed sites with an approved seed mix(s) will re-establish grass and forb species for soil stabilization and possible forage for wildlife. In forested areas, selective tree removal and preservation of tree corridors will be utilized for protection of the understory, increased soil stabilization, and visual enhancement.

Prevention and control of noxious weeds are an important concern in Montana. The Montana County Noxious Weed Management Act govern the control and spread of plants designated as noxious weeds. State laws specify that establishment of noxious weeds must be prevented and that they must be eradicated when possible.

In addition to State law, each county has a weed management plan in effect. Compliance with the weed control programs established by Madison County requires the identification of noxious weeds and implementation of control measures for areas disturbed during project construction. All disturbed sites are susceptible. The long-term effect is the replacement of native species with “undesirable” plant species.

MBR with regard to previous projects, has maintained a strong commitment toward the control and eradication of noxious weeds. Noxious weeds have been well managed and localized infestations contained or eliminated through the use of herbicides. Weed Management Plans for previous projects were submitted and approved by the Madison County Weed Control Board. However a new Plan is required by the Madison County Weed Control Board prior to subdivision approval. The plan is subject to approval by the board and must be in compliance with the District’s Weed Plan and the Montana Noxious Weed Control Act. A copy of the completed application form is included in Appendix E. Also included are maps of the Fall 2006 and 2007 treated weeds including areas and species treated.

Revegetation efforts will be designed to aid in the prevention of soil erosion, to encourage prompt growth to lessen invader species, to provide visual enhancement during summer months, and to incorporate native species to provide forage for wildlife and replace lost vegetation.

Reseeding will be completed on all disturbed areas including non-commercially landscaped areas such as ski runs, cut and fill slopes, pipeline corridors, culverts and road right of ways. Some of the disturbed areas are at high altitudes where growing conditions are harsh making species selection and seed source more critical. Seeding should be done as soon as possible after construction is completed. MBR has implemented and been successful in the revegetation of disturbed sites (ski runs, road cuts, etc.) with previous development projects. Every effort will be made to continue this effort to maintain as much native

vegetation as possible to revegetate disturbed areas with approved seed mixes, and to utilize a landscape plan that incorporates as many native, locally adapted species as possible.

Air Quality

Air Pollution Sources

The ambient air quality is generally excellent in southwestern Montana. Sources that may contribute to air pollution within the project area include wind and dust erosion, open burning, home heating devices, vehicular traffic, gravel crushers and construction activities.

Air quality monitoring efforts in the Big Sky area indicate that automobiles, construction activities and open burning are the primary contributors to air pollution in the area. Beyond Moonlight Basin and other Big Sky developments, wind erosion and agricultural activities are factors affecting air quality.

Carbon monoxide (CO) is a potential source of pollution. Sources include automobile and construction equipment exhaust. Other potential sources of CO emissions include open burning, forestry burning and residential wood combustion. The highest concentrations of CO occur in the summer months as a result of increased construction activities.

Particulate matter is the greatest air pollutant concern in Montana, although few areas in the state reach concentrations that exceed particulate matter standards. Major sources of particulate matter within the proposed project area may result from traffic on unpaved roadways (fugitive dust), residential wood combustion, open burning and wind erosion.

Airflow Conditions

Moonlight Basin is located in the Madison Range between the Spanish Peaks and Taylor Hilgard units of the Lee Metcalf Wilderness. The prevailing wind is from the west, which is influenced by the west to east topographical orientation of the valley.

Like other regions in Montana, this area is subject to temperature inversions in the fall and winter months. Inversions trap pollutants near the ground surface, elevating pollutant concentrations for extended periods.

Airshed Class

The area including Moonlight Basin is classified as a PSD (Prevention of Significant Deterioration) Class II Area, designated under the Clean Air Act as an area with reasonable or moderately good air quality while still allowing moderate growth. Airsheds designated as Class 1 areas in proximity to the project area are the Lee Metcalf Wilderness, Yellowstone National Park, Beaverhead and Gallatin

National Forest. Planned development activities must ensure that air quality in this Class I area is not negatively impacted.

Environmental Consequences

As a general practice, MBR will minimize emissions of pollutants to the atmosphere to the extent practicable. With the exception of wildfire, construction activities will minimize air emissions (primarily dust) by applying dust retardants (chemicals or water) to exposed soils subject to erosion. Other measures will be taken to reduce or control fugitive dust emissions that may be produced as part of the construction activities. All reasonable precautions will be taken to prevent the generation of fugitive dust. Prescribed burning will only be permitted under optimal weather and moisture conditions.

Development activities such as road construction, ski runs, building construction, etc. may temporarily affect the ambient air quality in the immediate vicinity of the construction due to increases in particulate matter (dust) and hydrocarbon combustion by-products from construction equipment. The disturbed areas may also be subject to wind erosion until herbaceous vegetation becomes established, which may require several months up to one year to regenerate.

The negative impacts to ambient air quality are expected to be minimal due to the short duration of construction and the implementation of mitigation measures. Impacts will be mild and temporary in duration. Dust control will be part of the construction permitting. Appropriate measures will be taken to minimize any dust release. Airborne dust will be minimized by spraying water on the disturbed areas, roadways, topsoil and spoil storage piles. These conditions will be monitored throughout construction. The replacement of topsoil/cover soil will be left in a roughened condition (ski runs or potential landscaped areas) to reduce erosive effects of wind and water.

Revegetation will follow immediately after completion of construction activities whenever possible. The disturbed areas will be revegetated with species that would begin to stabilize soils. Mulches, tackifying agents, and other erosion control materials will be used to minimize topsoil erosion by wind and water. Exposed areas, unstable slopes, or highly erodible soils may require tackifying. As necessary, erosion control blankets may be used on highly unstable slopes to reduce wind and water erosion.

Riparian Areas, Wetlands, Flood Prone Areas

Flood Prone Areas

Flood plain maps do not exist for perennial or intermittent streams, nor have flood hazards evaluations been conducted. Most of the mountain channels within the basin are fast moving (moderate to high gradient) and found in narrow v-canyons related to steep terrain. Where lots are proposed adjacent to waterways, a

minimum 100-foot construction setback will be maintained. This setback is required by the Madison County Subdivision Regulations (2006), as amended.

Other than road crossings, no construction activities within the stream bed or bank are proposed. No irrigation ditches or canals exist within the property.

Water Resources Protection Measures

Wetland and non-wetland waterway resources impacts are avoided to the maximum extent possible. Direct impacts to wetlands are avoided by restricting development within 100-feet of waterways. Building envelopes have been relocated to avoid wetland resources. When impacts are unavoidable, the appropriate permits are acquired through the US Army Corps of Engineers (Section 404) and the Madison County Conservation District (MT 310). BMPs are installed along all water resources prior to any adjacent disturbance to protect the resources from any unintentional input of materials. All areas intended for future development (all areas with “white” background on Figure 6) that have not been investigated for the presence of wetlands and non-wetland waterways will be scheduled for a field investigation prior to all 404 and 310 application submittals and the onset of any development.

To mitigate flooding potential at perennial and intermittent stream crossings, each crossing is assessed individually. Due to the history of logging in the basin, culvert and bridge sizing is based on historical data, i.e. MBR utilizes existing logging roads for the community’s access roads. Each culvert or bridge replacement is based on the performance of the historical crossings at or near the site. In addition, the culverts are sized to fit the stream channel dimensions for each crossing. Finally, culvert inverts are placed 6-inches below the existing streambed. The culvert grade will match the existing stream bed grade to allow for fish passage.

Wetland Mitigation

The MBR owners have established policies to insure that the water resources are inventoried, proposed impacts are permitted, and mitigation designed prior to the onset of development in an area. MBR submitted to the US Army Corps of Engineers a Section 404 Permit Application and Conceptual Mitigation Plan to address historic disturbances and future impacts for the entire project area. The permit application and mitigation plan were approved in August 2005. The permit was updated in February of 2007, and the mitigation plan was successfully implemented in October of 2007 (see Appendix K). A copy of the approved permit is included in (Appendix D).

Natural Topography

Topographic contours are shown on the ODP. Slopes range from gentle to very steep across Moonlight Basin. Development areas are located in places with lesser slopes and very steep slopes are avoided. Portions of the development clusters contain slopes over 25%. These areas were only considered if the

geotechnical hazard evaluation determined that these areas could be developed with conventional methods.

The natural topography is an important value of the property, and the cluster locations selected will allow development to complement the features of the landscape. Where site grading is required, natural rock retainage is used to reduce the footprint of the graded area. This treatment lowers the development's overall effect on the natural topography and compliments the mountainous terrain of the site.

Open Landscape, Scenic Beauty

The proposed ODP is designed to conserve land by the use of cluster development. This involves clustering homesites, which in turn maintain significant open space. The ODP's consolidation of areas has condensed the activity to the village sites and has opened up the major wildlife corridor, which is approximately 6,600 feet wide. The cluster developments occur where units are provided with scenic views and vistas (refer accompanying ODP) whilst respecting view sheds. These cluster developments are located at the base of ski runs and ski lifts, which offer the ease of ski in/ski out living. In addition the proposed subdivision has been designed to avoid ridgetops and visual encroachment into river corridors.

3-D: Effect on Wildlife and Wildlife Habitat

Major species of fish and wildlife that use the proposed development area include elk, deer, moose, bear and other animals like wolverines, bobcats, snowshoe hare, squirrels, etc.

Most, if not all of the major wildlife species in the area use the general area for breeding purposes. However, because they are highly mobile and breeding range is not confined, any likely interference with breeding activities or breeding success is small.

Mallard and green-winged teal are two species which inhabit the area during the summer and are associated with the ponds and lakes in the area. Because of development setback requirements, the lack of livestock grazing, and the absence of free-ranging pets, the breeding, nesting and brooding habitat will be maintained.

Threatened species which inhabit the area on occasion include grizzly bears and Canada lynx. Grey wolves which are classified as endangered may occur in the area at a future time. All of these species are highly mobile and are adaptable to human occupation. The only species which has identified key habitat in the area is the grizzly bear. Whitebark pine nuts are an important food source for grizzlies

during the spring and fall seasons. These types occur at the higher elevations. Little if any of this type will be affected by the development currently proposed. The proposed subdivision is not likely to displace wildlife in a way that will create problems for adjacent landowners.

Effects Overview

Actions of the various proposed developments and resulting human activities in the middle basin area of Jack Creek will result in a direct loss of habitat, conversion of habitat and reduced habitat security for some animals. Small animals that have small home ranges will be eliminated in the areas taken up by roads, parking lots, homes, water treatment areas, etc. Large animals, such as elk and deer, have large home ranges and have the option of adjusting their distribution during the summer to accommodate for habitat loss and human activity. Opening up of some timber types will create habitat for a certain species. Although deer and elk numbers may change somewhat within the Jack Creek Drainage, it is not likely that their numbers will be reduced within the greater area since winter range is more limiting to them than summer range. Moose, bear and other animals like wolverines, bobcats, snowshoe hare, squirrels, etc. may be an exception to this previous statement. More of their critical year-round habitat lies within the mountainous area. Moonlight property contains a large wildlife corridor which has been purposely left open to facility wildlife movement and connectivity. See the Wildlife Corridor Map attached as (Figure 10).

Effects of large tract Reserve Ranches home sites

Human disturbance factors will be greatest in this portion of the drainage during road and home construction activities. Habitat loss as a result of this action will be small. In summary, this type of development will have a small negative effect on wildlife populations especially after construction is generally complete. On the positive side, some small mammals and birds will be attracted to the landscaped habitats around the buildings.

Effects of Ski Runs and Related Activities

Ski runs will convert a considerable amount of north facing high elevation timber areas to lengthy swaths of grassy openings separated by long vertically running strips of timber. Current wildlife use in these timbered areas is generally of low density and dispersed in nature. During summer deer, elk and black bear use in this area could increase due to the presence of the newly created meadow type foraging areas. Bear on the other hand may have reduced availability of pine nuts during the fall. Loss of habitat could occur for moose, wolverine, snowshoe hare, bobcats, and other mostly small animals which inhabit these timber types. Human activity on these slopes will reduce security to some extent during the winter period.

Effects of the Golf Course

The golf course will affect a large area on the south side of Jack Creek and will generate considerable road traffic. It will create a large green monoculture

meadow which may be attractive to grazing animals especially during the end of summer and early fall when the rest of the areas vegetation is drying up. The “rough” periphery of the course, being influenced by the irrigation and fertilization of the fairways and greens, will contain a mixture of grassy and herbaceous plants which will attract a variety of birds and mammals. The golf course will not be a major factor in creating or diminishing wildlife habitat in this portion of Jack Creek. Most of the effect will result from the magnitude of human activity and the amount of roads and facilities created to support the operation of the golf course.

Effects of Dwelling Units

The Dwelling Units will likely have the greatest negative impact upon wildlife both from a habitat loss and disturbance standpoint. The degree of habitat loss will be directly related to the amount of area taken up by buildings, parking lots, roads and support facilities. The disturbance impacts will depend on amount of associated human activity on roads and in the natural areas adjacent to the developments. Small mammals will likely be impacted the most. A reduction in small birds, and mammals would reduce the potential food source of predatory animals such as bird of prey, coyotes, and mustellids. Certainly, there will be a disturbance issue and habitat loss for larger animals. It likely will mean a redistribution of deer and elk during spring, summer and fall. However, as a whole there should not be a population reduction in these species. Moose and bear carrying capacity may be reduced.

3-E: Effect on Public Health and Safety

Well Logs

Water supply for the future development areas shown on the ODP will be provided by public wells. Existing supply wells and test wells show that adequate water supply can be obtained for the proposed development. The existing public water supply wells have undergone, and continue to undergo, extensive testing to determine adequacy for public consumption. Test results are reported to and reviewed by Montana Department of Environmental Quality (MDEQ) based on the scheduling required by that agency. New public wells also have extensive testing required by MDEQ prior to use.

Natural Hazard

There is a possibility that the proposed subdivision will attract potentially dangerous wildlife such as bears due to an increase in refuse. However, all waste is compacted at the centralized compactor facility and stored in a sealed bear-proof container. This convenient facility can be used by all Moonlight Basin residents and as such this reduces the possibility of bears or other wildlife being exposed to individual on-site garbage containers at the homes or as they are waiting to be picked up.

Preliminary development clusters were evaluated for geotechnical hazards to determine risk associated with instability (Figure 7). For low risk sites the hazard evaluation recommends geotechnical investigations for foundation design and building location. For development areas with slight risk, geotechnical investigations for site mitigation of localized site stability would be required to determine appropriate construction measures. High risk areas that would require unconventional foundation systems have been avoided. Overall, the current state of the soil on the site is considered stable. Severe earthquakes or abnormally high water tables are the only concerns for the site becoming unstable in the future. In the event of severe conditions that may cause problems, the damage to structures would be minor. Prospective residents will be informed of the conditions and encouraged to do individual site evaluations before construction.

Manmade Hazard

The only man made hazard present on the site is a high-voltage overhead power line of Northwestern Energy (formerly Montana Power) that runs from Ennis to Big Sky, passing through Jack Creek. The power lines run through designated open space and will remain so. Where applicable, residences have been set back from this energy corridor. Possible future uses of the corridor include ski trails and summer spray irrigation of wastewater.

Fire Risk

MBR hired Joe King of Montana Wildfire as our consultant for a Fire and Management Plan. Mr. King has prepared a Fire Management Operations Guide for Moonlight Basin (Appendix J).

In 2007, Moonlight worked on 18 acres of fuels mitigation along the Madison Road from Moonlight Basin entryway westward. The mitigation included mature timber treatment of dead and down, ladder fuels within 20' of mature timber crowns and select diseased trees removed. The regeneration timber treatment included tree spacing average 8' (+/- 2'), leave trees preferred Douglas Fir and Engelmann Spruce, and select diseased trees were removed. Our community outreach included an article in the Moonlight Basin Employee Newsletter reaching up to 400 staff, roadside signage, and a presentation by Marc Glines in an outdoor educational program.

Response Time

The GCCRFD has estimated emergency response times to approximately 15 minutes to the developments located near the entrance to Moonlight Basin (Cowboy Heaven, Diamond Hitch, etc.) Moonlight has a contract for services during the winter season for the Madison Village Base Area. Moonlight and GCCRFD are currently in discussions to annex the remaining property in the fire district.

Public Safety

The only potential health or safety hazard in Section 24 is the high-voltage overhead power lines of Montana Power which pass through Jack Creek in route from Ennis to Big Sky. These power lines are located in land that will remain in Open Space owned by MBR. All residential areas have been setback from the power line corridor. Future land uses considered in the power line corridor include future ski trails and summer spray irrigation of wastewater.

There are no on-site or off-site uses which create a nuisance.

Chapter 4 . Additional Public Interest Criteria

4-A: Effect on Other Resources in the County

There are no known mineral resources of value in the area, there for the Moonlight Basin subdivision will not have an impact on the utilization of the County's mineral resources. The developments will have a positive effect adding to the County's outdoor recreation, tourism and scenic resources. The developments will also have no impact on cultural or historic resources as there are no known significant cultural or historic sites on the property that might be impacted.

Moonlight Basin is not located on previously publicly owned land. The overall affect on the County's resource base will be positive, as it will bring more tax and tourism revenue, provide additional outdoor recreation opportunities, tourism, and scenic resources. This will be most noticeable through the expansion of the existing Big Sky and Moonlight Basin Ski Area and the tourism it will attract. As the resource opportunities occur in designated areas during different seasons, there is no likely conflict between resource users. Therefore, the long run impacts on the area and the County's resources should be positive.

4-B: Effect on the County's Economy

Moonlight Basin's ODP with help strengthen the major sectors of recreation, tourism, and construction activity within the local economy. It will also help to diversify the economic base through attracting a diversified user base for the various recreational and tourism activities.

The ODP utilizes and protects the resources which support the major economic sectors of recreation and tourism. It will have no impact on the economic viability of family farms and ranches as there are none in the area.

New business and industry opportunities within tourism, recreation, and construction will be created, which are compatible with the major economic sectors of the County. There will be no strain on public services as the subdivision will pay its own way. Also, year-round and seasonal employment opportunities will increase with ski area and golf course development as well as the commercial opportunities that they present.

The overall economic impact by the proposed subdivision is likely to be positive in both the short and long-term.

4-C: Effect on Public Services Provided by Other Entities in the County

Moonlight Basin's ODP should not raise the cost of services provided by other entities as it will provide its own property owners association, road maintenance and utilities. Furthermore, the ODP should not have any other impacts on the services provided by other entities.

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